communications

OPERATING and SERVICE INSTRUCTIONS

#115001 - 142032

SX-115

the hallicrafters co.
MANUFACTURERS OF ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

TUBES AND FUNCTIONS

6DC6 RF Amplifier
6BA7 First Mixer
12AT7 Crystal Oscillator
6DC6 First IF Amplifier (6 MC to 6.5 MC)
6BA7 Second Mixer
6CB6 Variable Frequency Oscillator (VFO) (Linear)
6DC6 Second IF Amplifier (1005 KC)
6BA6 Third Mixer
12AT7 SSB Switching Oscillator
6DC6 Third IF Amplifier (50.75 KC)
6BY6 Product Detector
6BJ7 AM Detector, Second AVC Rectifier, AM ANL
12AX7 BFO, First Audio Amplifier
6AQ5 Audio Output
6AU6 100-KC Crystal Calibrator
6AU6 "S" Meter Amplifier
6AU6 First Loop AVC Amplifier
OA2 Voltage Regulator
Five Silicon Diodes

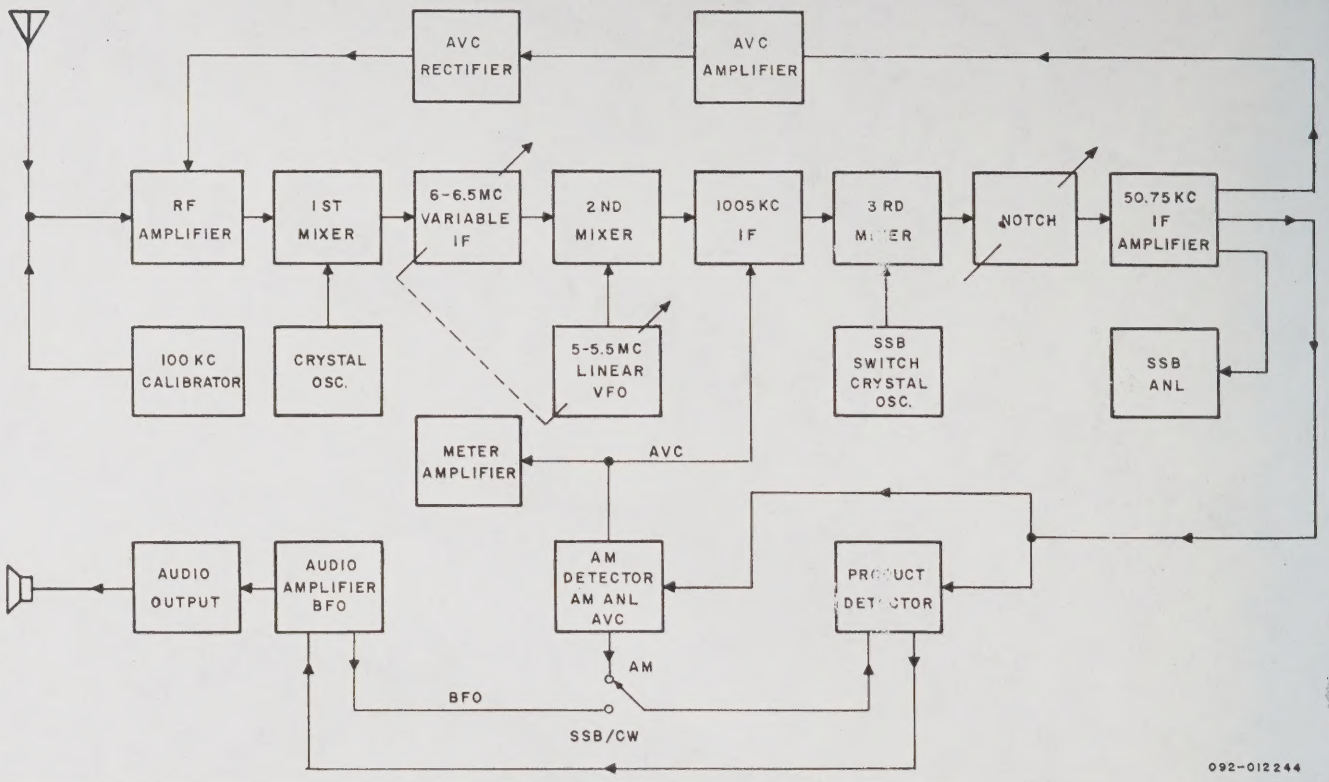


Figure 1. Block Diagram of Receiver.

TECHNICAL SPECIFICATIONS

FREQUENCY COVERAGE	
WWV	9.6 MC to 10.1 MC (Not Calibrated).
80-Meter Band	3.5 MC to 4.0 MC.
40-Meter Band	7.0 MC to 7.5 MC.
20-Meter Band	14.0 MC to 14.5 MC.
15-Meter Band	21.0 MC to 21.5 MC.
10-Meter Band	28.0 MC to 28.5 MC.
10-Meter Band	28.5 MC to 29.0 MC.
10-Meter Band	29.0 MC to 29.5 MC.
10-Meter Band	29.5 MC to 30.0 MC.

TECHNICAL SPECIFICATIONS (CONT.)

IF FREQUENCIES	6.505 MC to 6.005 MC (Variable), 1005 KC, and 50.5 KC.
RECEPTION	AM, CW, and Single Sideband (SSB).
SENSITIVITY-AM	Less than 1 microvolt for a 10-DB signal-to-noise ratio (30% modulation).
SENSITIVITY-SSB/CW	Less than 1/2 microvolt.
SELECTIVITY	Variable in five steps providing 0.5, 1, 2, 3, and 5 KC bandwidth at 6 DB down.
STABILITY	Better than 300 cycles after a 15-minute warmup.
CALIBRATION ACCURACY	Better than 1000 cycles between 100-KC calibration points after indexing.
IF REJECTION	More than 1000X (60 DB) down.
IN-BAND TWEETS	Less than 1 microvolt equivalent.
POWER GAIN	Less than 1 microvolt (30% modulation) for 0.5 watt audio output.
AUDIO POWER OUTPUT	1.5 watts with distortion less than 10%.
AVC FIGURE OF MERIT	More than 60 DB.
POWER SOURCE	105 volts to 125 volts, 50/60 cycles.
POWER CONSUMPTION	85 watts.
NUMBER OF TUBES	18 (including voltage regulator), plus 5 silicon diodes.
SPEAKER OUTPUT	3.2 ohms and 500 ohms, rear-mounted, three-contact, screw-type terminal strip.
HEADPHONE OUTPUT	50 ohms to 2000 ohms; panel mounted phone jack accepts standard 1/4-inch phone plug.
ANTENNA INPUT	50 ohms to 70 ohms unbalanced; rear chassis mounted SO-239 receptacle accepts Amphenol type 83-1SP coaxial connector.
AUXILIARY CONTROL SOCKET	Rear chassis mounted octal socket accepts standard 8-pin octal plug (supplied).
DIMENSIONS (overall)	16 inches wide, 10-1/2 inches high, and 16 inches deep.
SHIPPING WEIGHT	47 pounds.
NET WEIGHT	44 pounds.

Figure 2. View of Model SX-115 Receiver.

SECTION I

GENERAL DESCRIPTION

1-1. INTRODUCTION.

The Model SX-115 is a triple-conversion, heterodyne-type communications receiver having the following features:

A high order of mechanical and electrical stability.

Accurate frequency readout.

Linear tuning.

1-KC calibration marks on all bands.

Constant tuning rate.

Transmitter-type VFO with differential temperature compensation.

Back-lash free, gear-driven tuning mechanism.

Crystal-controlled first and third conversion oscillators.

Less than 1/2 microvolt sensitivity on SSB and CW.

Excellent spurious and image rejection.

Selectable sidebands.

Selectivity variable in five steps from 500 CPS to 5 KC.

Amplified, dual-loop AVC with fast attack and slow release.

Product detector for SSB/CW; envelope detector for AM.

IF-type noise limiter for SSB/CW; automatic threshold series type for AM.

Band gain equalization.

Audio inverse feedback.

Reduced weight through the use of aluminum panel and chassis construction.

Built-in, 100-KC crystal calibrator.

Heating element for reduced warmup drift.

SECTION II

INSTALLATION

2-1. UNPACKING.

After unpacking the receiver, examine it closely for damage which may have occurred in transit. Should any sign of damage be apparent, file a claim immediately with the carrier stating the extent of damage. Carefully check all shipping labels and tags for instructions before removing or destroying them.

2-2. LOCATION.

The receiver may be placed in any location that will permit free air circulation through the ventilation holes and openings in the cabinet. Avoid excessively warm locations such as those near radiators and heating vents. Also avoid direct blasts of air from circulating fans, etc. Do not place speakers or any other objects that will impair natural ventilation on the cabinet cover.

2-3. ANTENNAS.

The Model SX-115 uses a special bandpass type circuit designed for an unbalanced 50-ohm to 70-ohm input. Any of the popular dipole or beam antennas using 50-ohm to 70-ohm coaxial transmission line will suffice. It should be remembered, however, that these antennas will only give optimum results over a limited frequency range. Generally speaking, the same rules that apply to transmitting antennas will hold true for receiving antennas. For further information on this subject, refer to the "Radio Amateur's Handbook" or the "A.R.R.L. Antenna Book", both published by the American Radio Relay League, West Hartford, Connecticut, U.S.A.

IMPORTANT

Some form of lightning protection should be provided which will comply with local code requirements.

2-4. GROUNDS.

All station equipment should be bonded together with heavy copper wire or braid and connected to a cold water pipe or earth ground. An external chassis ground terminal is provided on the rear of the Model SX-115 for this purpose.

2-5. POWER SOURCE.

The SX-115 is designed to operate from a 105-volt to 125-volt, 50/60-cycle AC power source. Power consumption is 85 watts.

NOTE

If in doubt about your power source, contact your local power company prior to inserting the power cord into any power outlet. Plugging the power cord into the wrong source can cause extensive damage to the unit.

2-6. SPEAKER.

A three-contact terminal strip, marked "G", "3.2" and "500", is provided at the rear of the receiver for connecting an external speaker or line (see figure 3). Any permanent-magnet type speaker with a 3.2-ohm voice coil can be used by connecting the two leads from the speaker voice coil to the terminals marked "3.2" and "G". If it is desired to use a speaker with a voice coil impedance other than 3.2 ohms, a matching transformer should be employed to insure optimum performance. The transformer should be mounted on or near the speaker and should have a five-watt power rating, a 500-ohm primary impedance, and a secondary impedance to match that of the speaker voice coil. Connect the primary of the matching transformer to terminals "500" and "G" and the secondary to the speaker voice coil terminals.

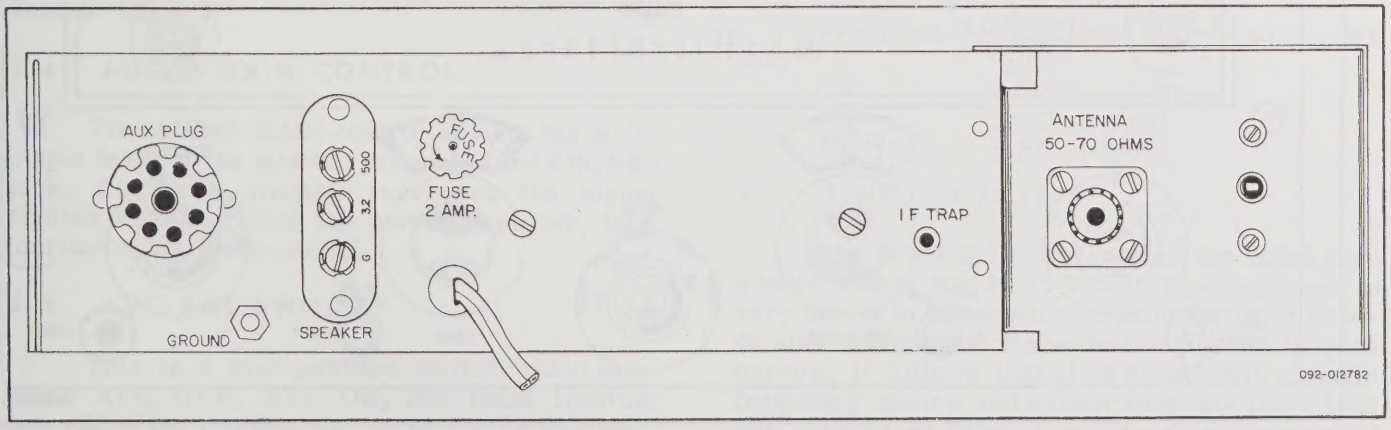


Figure 3. Rear View of Receiver.

It should be noted that insertion of the headphone plug into the front panel headphone jack will silence the 3.2-ohm speaker output. However, the 500-ohm output will remain in operation at all times.

The Hallicrafters Model R47 speaker is designed for use with your receiver. The leads are connected to terminals "3.2" and "G".

2-7. HEADPHONES.

The headphone jack marked PHONES is located on the front panel and is so wired that the 3.2-ohm speaker output is automatically disabled when the headphones are inserted. The headphone impedance is not critical, and any headphones ranging in impedance from 50 ohms to 2000 ohms will provide satisfactory performance.

2-8. REMOTE RECEIVE-STANDBY SWITCH.

The receiver may be disabled from a remote location by connecting a remote SPST switch or relay between pins 1 and 4 of the auxiliary socket at the rear of the chassis. To operate the receiver with the remote switch, the RECEIVE-STANDBY switch on the front panel must be left in the STANDBY position. See figure 4.

2-9. RELAY AND TRANSMITTER SWITCHING.

One-half of the RECEIVE-STANDBY switch connects terminals 2 and 5 of the auxiliary socket (chassis rear) when the switch is placed in the STANDBY position. This may be used to actuate a transmitter control relay or for other applications where the current does not exceed 1 ampere at 125 volts AC or DC. See figure 4.

2-10. IF OUTPUT.

The 50.75-KC IF output is available at pin 7 of the auxiliary socket (SO2). Any connection to this terminal should be made with the shortest possible length of low capacity cable and fed only into a high impedance input. Complete shielding is VERY important.

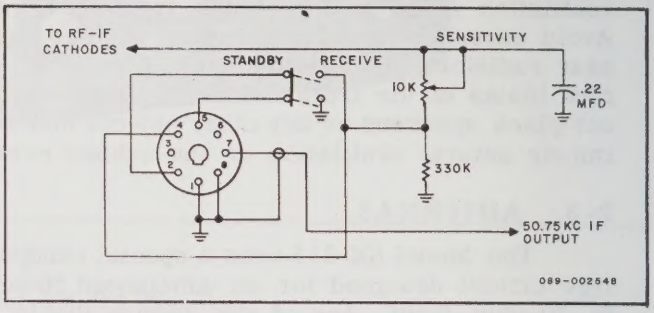


Figure 4. Sensitivity and Receive-Standby Circuit.

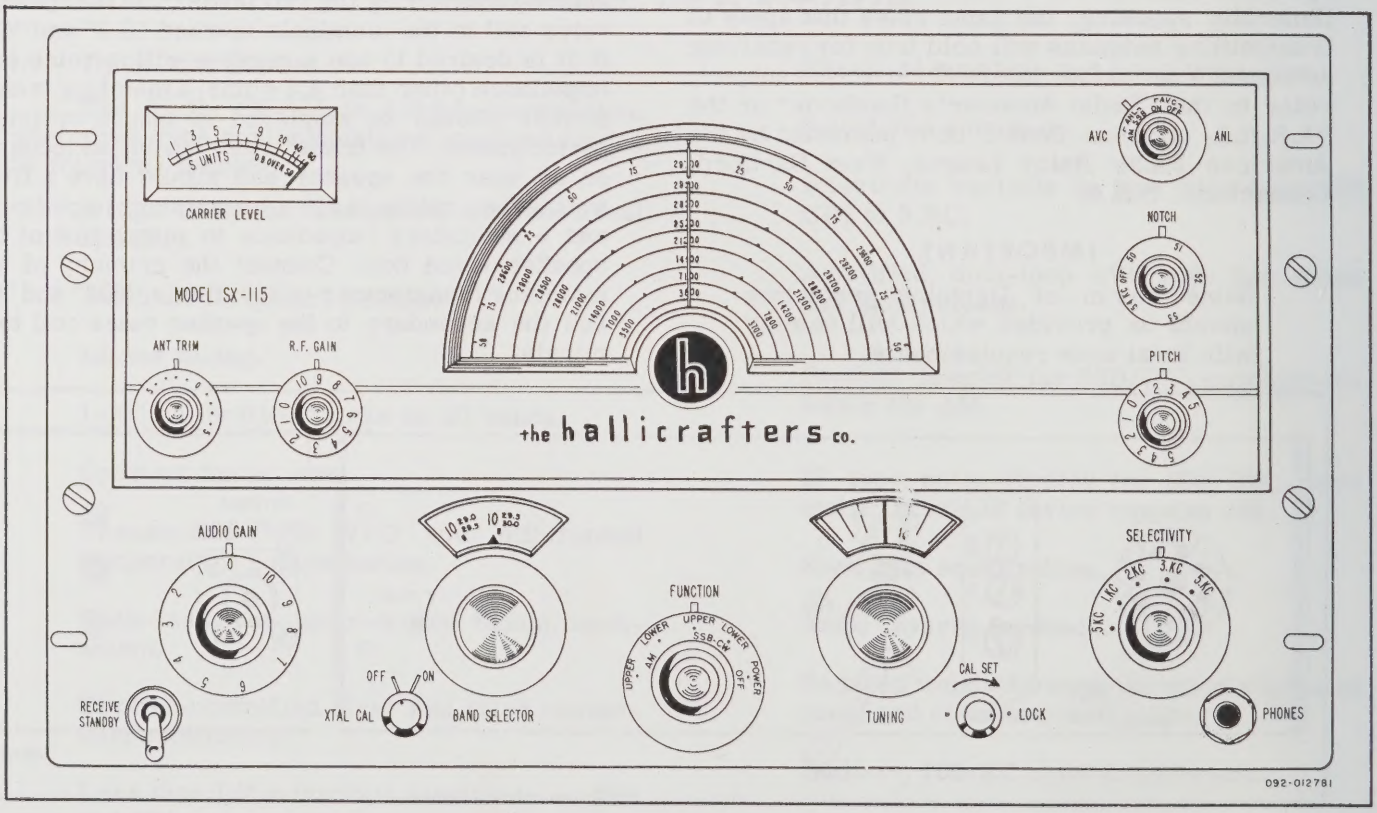


Figure 5. Front Panel of Receiver.

SECTION III

FUNCTION OF OPERATING CONTROLS

3-1. RF GAIN CONTROL.

The RF GAIN control varies the gain of the RF amplifier and the 1005-KC IF amplifier. Maximum sensitivity is obtained with the control set at "10" (fully clockwise). In this position, the tubes being controlled are operating at maximum gain with minimum cathode bias. As the control is rotated counterclockwise, the cathode bias is increased with a resultant decrease in gain.

To realize the full benefit of the excellent AVC characteristics of the Model SX-115 and to obtain accurate "S" meter readings, the RF GAIN control should be set at "10" (maximum sensitivity) for all conditions of normal operation.

3-2. BAND SELECTOR CONTROL.

The BAND SELECTOR control operates the bandswitch to place the proper crystal and coils into the circuit to cover the desired frequency range. The band covered by each position is indicated in the window directly above the control. This control also actuates the dial pointer so that the dial scale in use may be readily identified. Band gain equalization is automatically provided by this control.

3-3. ANTENNA TRIMMER.

The ANT. TRIM control operates a variable capacitor connected across the secondary of the antenna coil in use. Adjustment of this capacitor compensates for the loading effect of various types of antennas. This control is adjusted for maximum signal after the TUNING control is adjusted to the desired frequency. Once adjusted, the ANT. TRIM usually requires no further adjustment until the receiver is switched to another band.

3-4. AUDIO GAIN CONTROL.

The AUDIO GAIN control adjusts the audio output level at the speaker terminals and PHONES jack. Clockwise rotation increases the signal applied to the grid of the audio amplifier, thus increasing the audio output.

3-5. AVC-ANL SWITCH.

This is a four-position switch which provides AVC OFF, AVC ON, SSB noise limiting and AM noise limiting. In the AVC OFF position, AVC voltage is removed from all controlled stages except the "S" meter amplifier. This allows the "S" meter to be used to indicate relative signal strength or as a tuning indicator. In the AVC ON position, both AVC loops are in operation to automatically control the receiver gain. In the SSB-ANL position, the AVC circuitry remains in operation and the SSB IF noise limiter is placed in operation. This position should be used on SSB if noise problems are encountered. It may be found desirable to use this position at all times for CW reception as it is quite effective in removing key clicks, etc. from CW signals. This position is not satisfactory for AM reception.

The AM-ANL position allows the AVC circuitry to remain in operation and also places the automatic threshold series noise limiter in operation. This position should be used, as noise conditions dictate, for AM reception. This position is not satisfactory for SSB or CW reception.

3-6. SELECTIVITY CONTROL.

The SELECTIVITY control is used to vary the IF selectivity of the receiver to suit receiving conditions. Five degrees of selectivity are available, ranging from 500 CPS for CW reception under crowded band conditions to 5 kilocycles for maximum fidelity of voice modulated signals where band conditions permit. The five selectivity positions are indicated on the SELECTIVITY control and indicate the 50.75-KC IF bandwidth at the 6-DB points.

NOTE

Unlike most receivers, the selectivity is improved in the AVC-ON position because of the selectivity characteristics of the front-end AVC loop. Figure 6 contains IF selectivity curves.

Recommended positions for various modes are:

CW	0.5 KC or 1 KC
SSB	2 KC or 3 KC
AM	3 KC or 5 KC

3-7. T-NOTCH FILTER.

The NOTCH control varies the notch frequency within the 50.75-KC IF passband and is very useful in attenuating or eliminating an undesirable heterodyne. Since the notch width is quite narrow, it follows that it is essentially a single frequency device and cannot attenuate more than one heterodyne if the heterodynes are separated by more than 500 cycles in frequency.

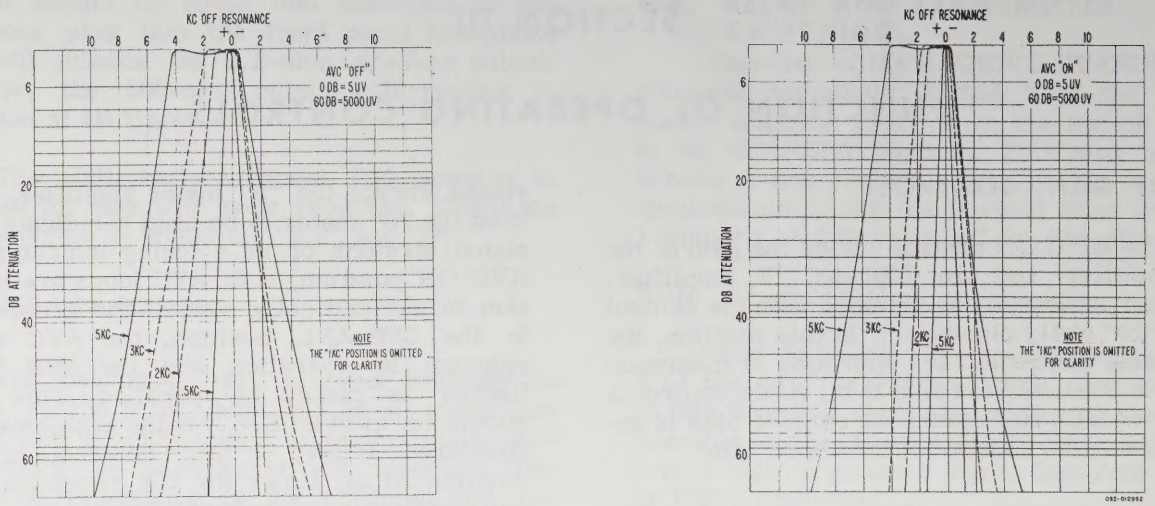


Figure 6. IF Selectivity Curves.

The T-Notch is very effective when using exalted carrier reception (AM with BFO on). The NOTCH control is adjusted to approximately 50 KC so that the incoming signal carrier is removed. This will remove the low frequency heterodyne which may be heard if the receiver is not tuned to exactly zero beat with the incoming signal. The AM signal under these conditions will tune similar to double-sideband suppressed carrier and may be received in either upper or lower sideband position. (See figure 7.)

3-8. PITCH CONTROL.

The PITCH control is a front panel adjustment to allow the beat frequency oscillator to be set at exactly 50 KC.

NOTE

The PITCH control should not be used for tuning purposes as the BFO frequency must be maintained if best performance is to be achieved.

The correct control setting will be near "0" on the PITCH control knob. The exact point may be found by placing the FUNCTION control in UPPER SSB/CW, the SELECTIVITY to 5 KC, and the XTAL CAL. switch to ON.

Adjust TUNING to near zero beat at any 100-KC Cal. check point. Switch the FUNCTION control to LOWER SSB/CW and adjust the PITCH control until the frequency of the beat note remains the same in either UPPER or LOWER SSB/CW position. After this position has been established, the control should remain in this position at all times.

3-9. FUNCTION SWITCH.

The FUNCTION switch performs four functions: (1) It turns the receiver ON and OFF; (2) it switches the third conversion oscillator to operate at the required frequency (995 KC for LOWER sideband and 1055 KC for UPPER sideband); (3) It turns on the BFO in both SSB/CW positions to provide the heterodyning signal necessary for this type of reception; and (4) It selects either the product detector circuit (SSB/CW) or the diode detector (AM), connecting the product detector tube as an additional audio amplifier for AM operation.

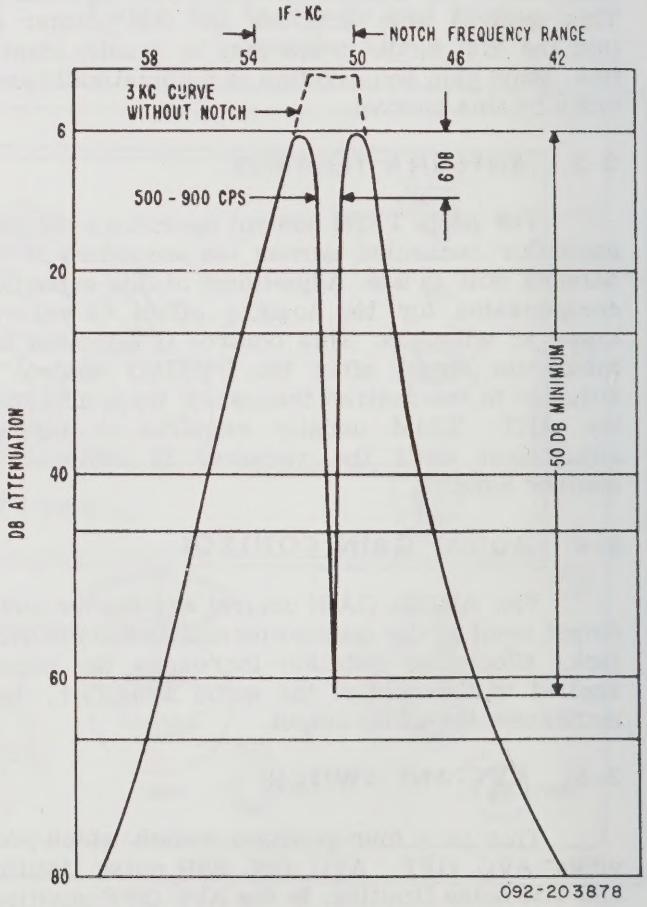


Figure 7. IF Selectivity with Notch.

To illustrate how selectable sideband reception is accomplished, a numerical example is given. Consider an incoming signal at 7000 KC, modulated 1 KC. Since modulation of a carrier causes the generation of sideband frequencies numerically equal to the carrier frequency plus or minus the modulation frequency, the incoming signal consists of the carrier at 7000 KC, a lower sideband at 6999 KC, and an upper sideband at 7001 KC. See figure 8.

The incoming signal is first heterodyned with the output of the first conversion oscillator in the first mixer. The first conversion oscillator operates at a frequency higher than the incoming signal by an amount equal to the first IF frequency of 6.505 MC (variable IF). As a result of this, three new lower frequencies are produced in the output of the first mixer: the carrier at 6.505 MC, the lower sideband at 6.506 MC and the upper sideband at 6.504 MC. These signals are amplified by the 6.505 MC to 6.005 MC IF stage and then heterodyned with the output of the VFO (5.5 MC to 5.0 MC) in the second mixer. Three new lower frequencies are again produced in the output of this mixer stage: a center frequency of 1005 KC, a lower sideband of 1006 KC and an upper sideband of 1004 KC. These signals are amplified by the 1005-KC IF amplifier and fed to the third mixer where they are heterodyned with the output of either the 955-KC (lower sideband) or the 1055-KC (upper sideband) crystal controlled third conversion oscillator. When the FUNCTION switch is placed in LOWER position, three new lower frequencies are produced: the carrier frequency at 50 KC, the lower sideband at 51 KC and the upper sideband at 49 KC. By referring to figure 8, it can be seen that the lower sideband falls within the IF passband and the upper sideband is rejected. When the FUNCTION switch is placed in UPPER position, the carrier frequency remains at 50 KC but the sidebands have been reversed in the heterodyning process. The upper sideband will now be 51 KC and falls within the IF passband while the lower sideband will appear at 49 KC and be rejected.

3-10. XTAL CAL. SWITCH.

The XTAL CAL. switch controls the operation of the built-in, 100-KC crystal calibrator. When the switch is placed at ON, the calibrator will provide marker signals at every 100-KC point on the dial.

NOTE

The XTAL CAL. switch should be turned to OFF immediately after dial calibration has been completed to avoid the possibility of generating spurious responses in the receiver.

3-11. TUNING CONTROL.

The TUNING control is used to tune the desired signal within the selected band. It also operates the main tuning dial and the kilocycle dial.

The receiver frequency is read from the dial as follows:

The red pointer rising from the hub of the main tuning dial follows the bandswitch setting to show the scale in use. This dial scale carries the 100-KC increments and, for reference, the 50-KC markers.

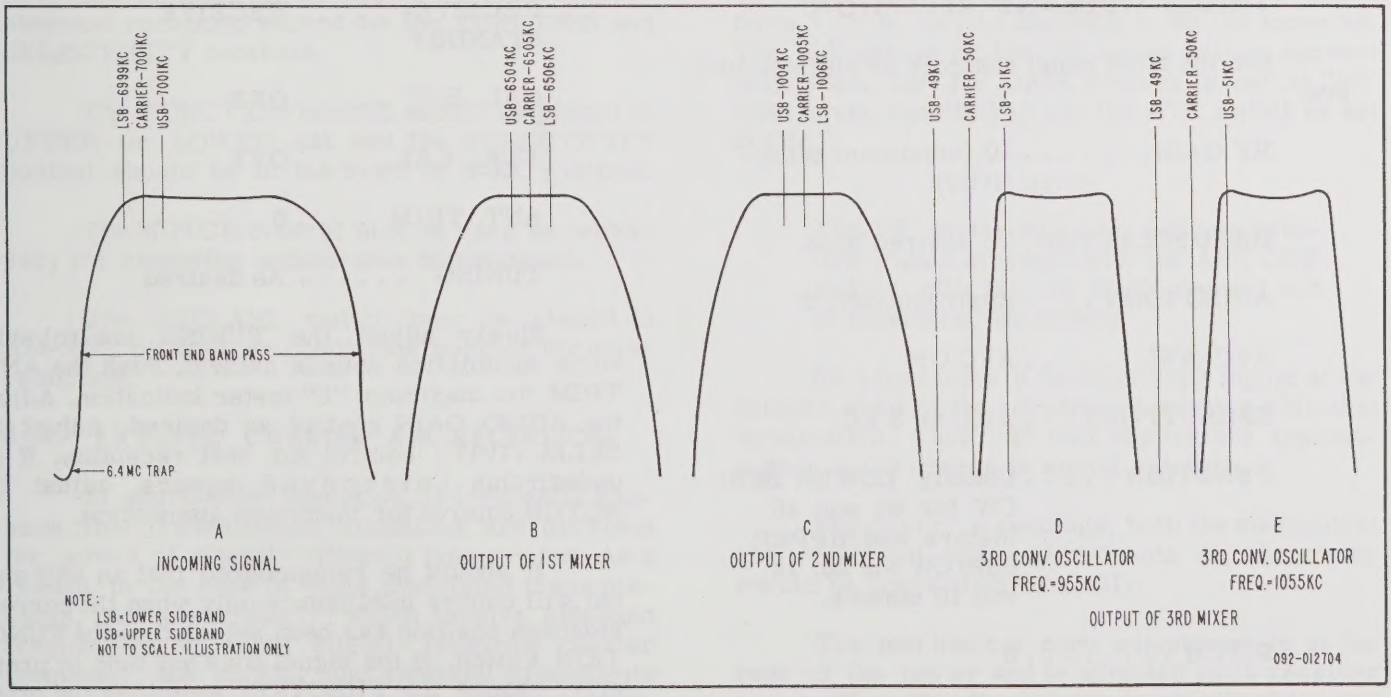


Figure 8. Selectable Sideband Response Curves.

Located at the outer rim of the dial is a fixed pointer and the 25-KC increment scale which divides the 100-KC segments into 25-KC segments. Note that each rotation of the TUNING knob changes the receiver frequency by 25 KC, dividing the 25-KC segments into 1-KC segments.

The dial frequency may be read in the following manner: Read the pertinent numbers on the main dial scale in use. These appear to the left of the movable pointer. To this, add the number of kilocycles that are indicated to the left of the pointer on the segment scale at the outer rim of the main dial. To these numbers, add the number of kilocycles indicated on the kilocycle dial.

For example:

3985 KC is arrived at as follows:

3900 KC on the 80 M scale plus 75 KC on the outer scale plus 10 KC on the kilocycle dial = 3985 KC.

3-12. CAL SET CONTROL.

The CAL. SET control serves two functions: first, it indexes the kilocycle dial exactly to frequency; second, it serves as a friction brake on the tuning mechanism to prevent accidental frequency shift.

To obtain maximum calibration accuracy, the VFO unit should be indexed at the nearest 100-KC calibration mark on the dial. This may be accomplished in the following manner:

1. Turn the XTAL CAL. switch to ON.
2. Turn the FUNCTION switch to UPPER or LOWER SSB/CW.
3. Adjust the TUNING control to zero beat at the nearest 100-KC point.
4. If the kilocycle dial does not indicate "O" with the receiver tuned to zero beat, turn knob until the kilocycle dial reads "O". Rotate CAL. SET to LOCK (fully clockwise). Tune back to zero beat with the kilocycle dial locked. This allows the receiver tuning to be changed but holds the kilocycle dial stationary at the desired point. After zero beat has been reached, release CAL. SET (turn fully counterclockwise).

For accurate frequency readout on AM, the FUNCTION switch should be placed in UPPER or LOWER SSB/CW position and the TUNING adjusted to zero beat with the incoming carrier. If exalted carrier reception (AM with BFO on) is used, the indicated frequency will be the correct frequency.

SECTION IV

OPERATION

4-1. SINGLE-SIDEBAND RECEPTION.

Set the front panel controls as outlined below.

RF GAIN. . . . . 10 (maximum sensitivity)

BAND SELECTOR. To desired band

AUDIO GAIN . . . . Approximately 2

AVC-ANL . . . . . AVC ON

SELECTIVITY . . . 2 KC or 3 KC

FUNCTION . . . . . Usually LOWER SSB/CW for 80 and 40 meters and UPPER SSB/CW for 20, 15, and 10 meters.

PITCH 0

NOTCH . . . . . OFF

RECEIVE-STANDBY . . . . . RECEIVE

CAL. SET . . . . . OFF

XTAL CAL. . . . . OFF

ANT. TRIM 0

TUNING . . . . . As desired

Slowly adjust the TUNING control until voice modulation sounds natural. Peak the ANT. TRIM for maximum "S" meter indication. Adjust the AUDIO GAIN control as desired. Adjust the SELECTIVITY control for best reception. If an undesirable heterodyne appears, adjust the NOTCH control for maximum attenuation.

It should be remembered that an SSB signal will convey intelligence only when the correct sideband position has been selected on the FUNCTION switch. If the signal does not tune in properly, change the FUNCTION switch to the other SSB/CW position.

The RF GAIN control should be set at 10 (maximum sensitivity) for all conditions of normal operation and the receiver volume should be controlled with the AUDIO GAIN control. Failure to do this will degrade the excellent AVC characteristics of the receiver and will also change the "S" meter calibration.

Do not use the PITCH control for tuning purposes. It must be set as described in paragraph 3-8 if best performance is to be realized.

The AVC-ANL control may be used as conditions warrant for noise reduction.

4-2. CW RECEPTION.

Set all controls as described under single-sideband reception except for the SELECTIVITY and AVC-ANL controls.

The SELECTIVITY control will normally be in the 0.5-KC or 1-KC position for CW reception.

The AVC-ANL control should be placed in SSB-ANL position at all times. This is very useful in removing key clicks as well as impulse type noise.

Under all conditions of normal operation, the RF GAIN control should be set at 10 (maximum gain). Do not use the PITCH control for tuning purposes.

4-3. AM RECEPTION.

Set all controls as described under single-sideband reception except for the FUNCTION and SELECTIVITY controls.

The FUNCTION control should be placed in UPPER or LOWER AM and the SELECTIVITY control should be in the 3-KC or 5-KC position.

The NOTCH control may be used as necessary for removing undesirable heterodynes.

The AVC-ANL switch may be placed in AM-ANL position as conditions warrant for noise reduction.

4-4. EXALTED CARRIER AM RECEPTION.

In short-wave reception, it frequently happens that transmission conditions are different for waves of slightly different frequencies. As a result, in the case of voice modulated transmissions, AM particularly, which involve sideband frequencies differing slightly from the carrier frequency, the carrier and sideband components may not be received in the same relative amplitudes and phases that were present at the transmitter. This effect, known as selective fading, causes severe distortion of the signal.

This type of distortion can be reduced considerably by utilizing the selectable sideband feature of the Model SX-115 receiver operating in an exalted carrier mode (i.e., the transmitted carrier is positioned out of the receiver's IF passband along with one sideband, producing a suppressed carrier single-sideband signal). The carrier is subsequently reinserted by the receiver's BFO and the signal is detected in the same manner as a single-sideband signal.

All controls should be set as described under single-sideband reception. Place the FUNCTION switch in the SSB position that gives best reception. In addition, the NOTCH control should be adjusted to the carrier frequency (approximately 50 KC) to null out the incoming signal carrier.

If noise conditions warrant, the AVC-ANL control should be used.

4-5. USE AND ADJUSTMENT OF "S" METER.

The "S" meter provides a visual means of determining whether or not the receiver is properly tuned, as well as an indication of the signal strength. The "S" meter circuit consists of a D.C. milliameter connected in the cathode circuit of the meter tube, the grid of which is controlled by AVC voltage. Since the cathode current of the tube varies with the strength of the incoming signal, the meter will indicate signal strength. The meter is calibrated in "S" units from 1 to 9, and in decibels to 60 DB above S9. The indications on the "S" meter will be correct only when the RF GAIN control is set at "10" (maximum sensitivity) and the AVC switch is set at ON.

NOTE

The "S" meter will also indicate relative signal strength with the AVC OFF and/or with the RF GAIN control not at maximum sensitivity.

S9 represents a 50-microvolt signal at the antenna input to the receiver, assuming a 50-ohm termination. Each "S" unit represents approximately 6-DB change in signal strength.

For accurate readings, both the mechanical and electrical zero adjustments on the meter should be checked periodically.

The mechanical zero adjustment is at the rear of the meter and is adjusted (with receiver power off) so that the pointer is exactly at the end of the meter scale on the right-hand side.

The electrical zero adjustment (meter zero) should be made after the receiver has been thoroughly warmed up. With the RF GAIN control at "O", the meter zero control (mounted on top of chassis near the VFO) is adjusted so that the meter pointer is exactly at the end of the meter scale on the left-hand side.

NOTE

Do not adjust factory gain control unless an accurately calibrated signal source is available (see Adjustment of Factory Gain "S" Meter Control).

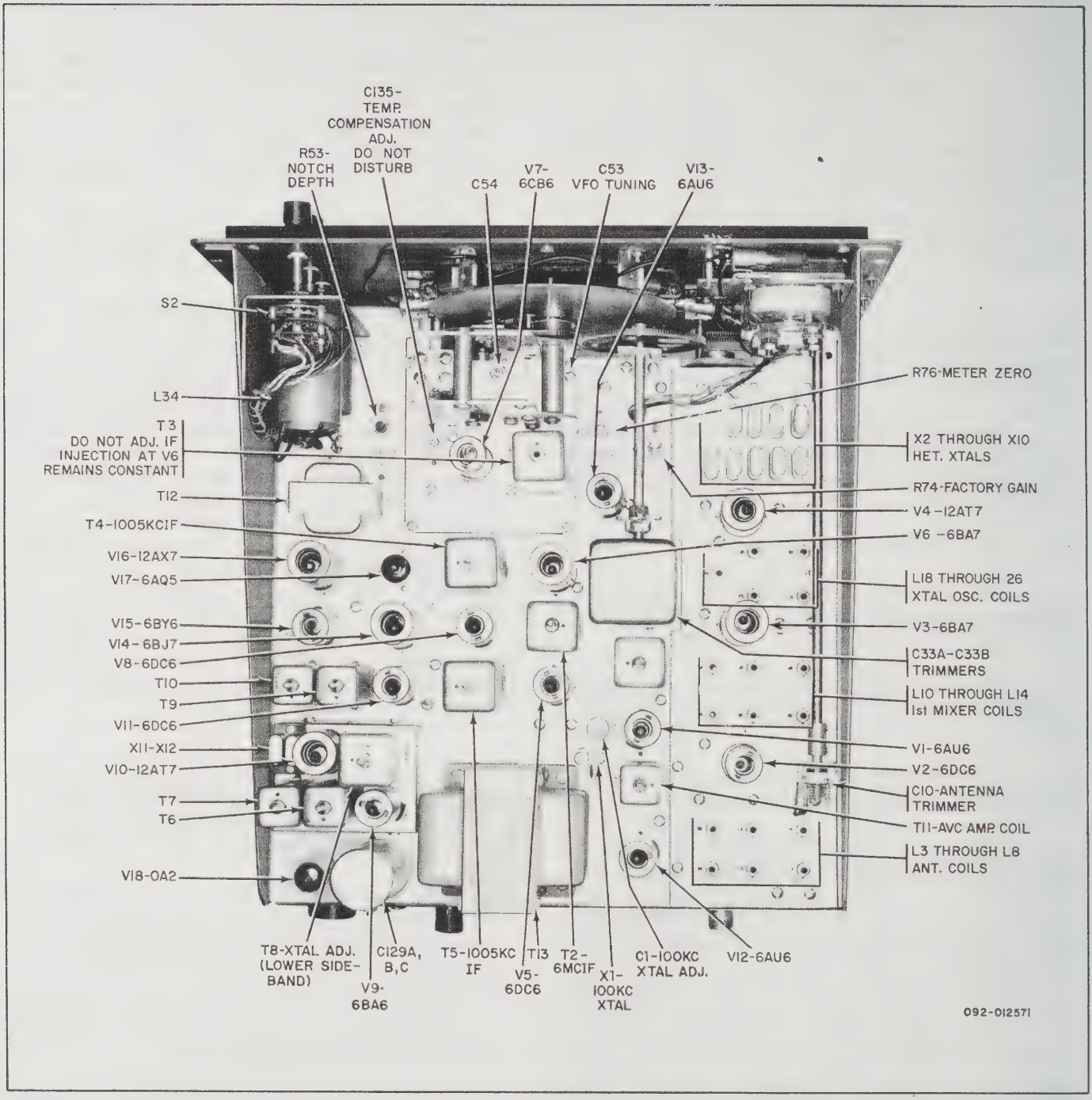


Figure 9. Top Chassis View of Receiver.

SECTION V

ALIGNMENT

5-1. GENERAL.

Alignment of the receiver should not be attempted until all other possible causes of faulty operation have been exhausted.

NOTE

Do not make any alignment adjustments unless the operation of this receiver is fully understood and adequate test equipment is available.

5-2. TEST EQUIPMENT REQUIRED.

1. Signal generator having 50-KC to 30-MC coverage, a calibrated output level meter, and a 50-ohm termination.
2. Vacuum tube voltmeter (VTVM).
3. Output meter (or AC scale of VTVM). If a VTVM is used, connect it to terminals "500" and "G", and terminate the output with a 500-ohm, 2-watt, resistive dummy load.
4. Alignment tool such as General Cement's No. 8606.

5-3. INITIAL CONTROL SETTINGS.

BAND SELECTOR . . . As indicated in chart

AUDIO and RF GAIN . . 10 (Maximum)

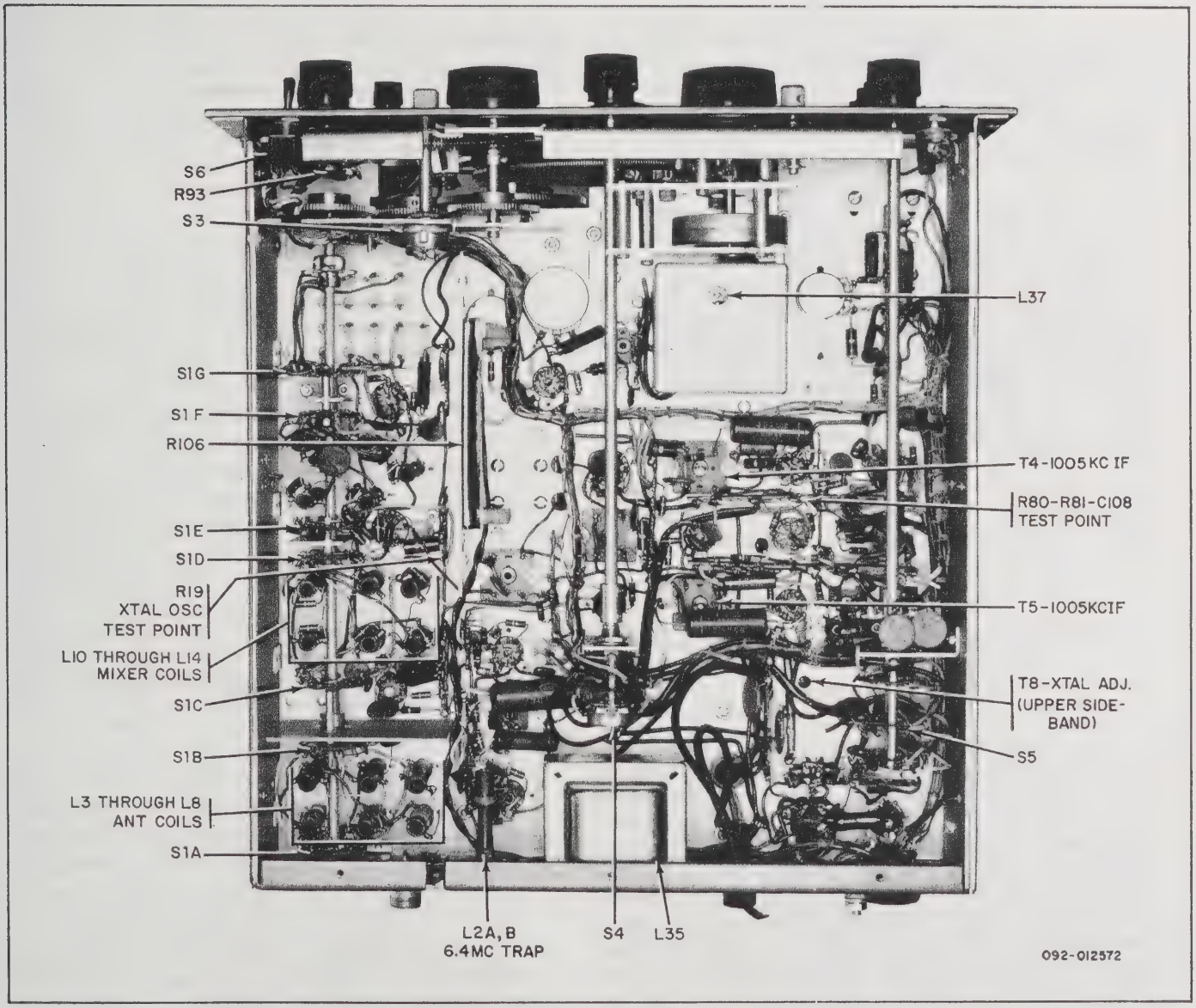


Figure 10. Bottom Chassis View of Receiver.

AVC ..... OFF

SELECTIVITY .. As indicated in chart

FUNCTION..... UPPER - AM

RECEIVE - STANDBY .... RECEIVE

TUNING ..... As indicated in chart

NOTCH ..... OFF

ANT. TRIM ..... Mid-point

XTAL CAL. .... OFF

PITCH 0

5-4. ALIGNMENT PROCEDURE.

Step	Signal Generator Connections	Generator Frequency	Band	Output Connections	Selectivity Setting
1	High side directly to terminal 1 of T5	50.75 KC unmod (critical)	80M	VTVM DC Probe to junction of R80, R81, and C108	.5 KC

Remove first conversion oscillator tube (V4) from socket to prevent signal interference. Adjust top slugs of T3, T7, T9, T10 for maximum indication maintaining approximately 1-volt reading on VTVM.

Alignment of 1055-KC Third Conversion Oscillator and 1005-KC IF's

2	High side directly to pin 7 of V6	1005 KC mod	80M	Output meter across appropriate speaker output terminals	5 KC

Tune generator slowly through 1005 KC to determine IF passband. Then set generator to center of passband, using sufficient generator output to obtain approximately 1/2 watt receiver output.
If no output is obtained, the 1055-KC crystal oscillator may not be oscillating and it will be necessary to turn up the generator output and adjust the 1055-KC crystal activity adjustment (bottom slug of T8) until output is obtained. Adjust for maximum output by adjusting the generator frequency, crystal activity, and the 1005-KC IF slugs (top and bottom of T4 and T5). Note that the signal suddenly disappears when the crystal activity slug is turned into the coil and gradually drops in level when the slug is backed out of the coil. Set the crystal activity adjustment (bottom slug of T8) for a 6-DB reduction in level (as indicated on the output meter) on the gentle slope side of maximum response. Then set the generator as near the center of the IF passband as possible, tune in either direction from center, and observe the response. If it is symmetrical, the adjustment is completed; if not, reset the generator frequency near the center of the passband and repeak T4 and T5.

Alignment of 955-KC Third Conversion Oscillator

3	High side directly to pin 7 of V6	1005 KC mod	80M	Output meter across appropriate speaker output terminals	5 KC

Set FUNCTION control at LOWER-AM. Tune generator slowly through 1005 KC to determine IF passband. Set generator to center of passband, using sufficient generator output to obtain approximately 1/2 watt receiver output. If no output is obtained, the 955-KC crystal oscillator may not be oscillating and it will be necessary to increase the generator output and adjust the 955-KC crystal activity adjustment (top slug of T8) until output is obtained. Adjust for maximum output by adjusting the signal generator frequency and the crystal activity (top slug of T8). Note that the signal suddenly disappears when the crystal activity slug is turned into the coil and gradually drops in level when the slug is backed out of the coil. Set this slug to a point on the gentle slope side of maximum response that produces the same audio output as that obtained with FUNCTION switch in UPPER-AM position.

Alignment of 6.0-MC to 6.5-MC Variable IF

4	High side directly to pin 7 of V3	6.050 MC	80M	Output meter across appropriate speaker output terminals	5 KC
5	Same	6.45 MC	Same	Same	Same

Replace V4 and adjust receiver TUNING until a signal is heard at approximately 3.95 MC. Adjust top slug of T1 and T2 for maximum receiver output.

Adjust receiver TUNING until a signal is heard at approximately 3.55 MC. Adjust both trimmers on C33 for maximum receiver output. These trimmers are accessible through the side of the shield can that covers C33. Repeat slug and trimmer adjustments as previously described until no further increase is noted.

5-5. ADJUSTMENT OF CRYSTAL CONTROLLED FIRST CONVERSION OSCILLATOR.

All of the coil forms in this group, except the WWV coil, have two separate coils and two separate adjustments; (i.e., 80M and 10M-1, 40M and 10M-2, etc.). In all cases, the low frequency adjustment will be nearest the top of the chassis and the 10-meter adjustment will be the core near the bottom of the coil form (see figure 11). All adjustments may be made from the top or bottom of chassis when using an alignment tool such as General Cement's No. 8606.

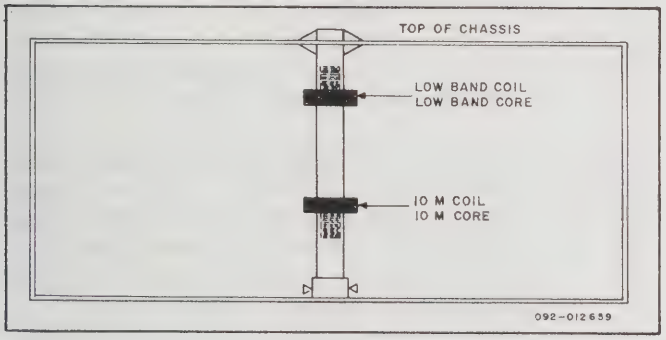


Figure 11. Coil Forms (Crystal Oscillator Plate).

Connect a VTVM (set to read negative DC voltage on 10-volt scale) at the point where R19 (1 megohm) connects to terminal strip near V3. Starting with 80M, adjust each oscillator core in order of increasing frequency, for maximum voltage indication on the VTVM as the BAND SELECTOR switch is advanced through the various ranges. Coil locations are clearly marked on the chassis.

NOTE

After all other adjustments have been made, it is permissable to warp the crystal frequency by rotating the appropriate core slightly to allow more accurate band-to-band calibration, consistent with positive oscillator start as the BAND SELECTOR is rotated through each range.

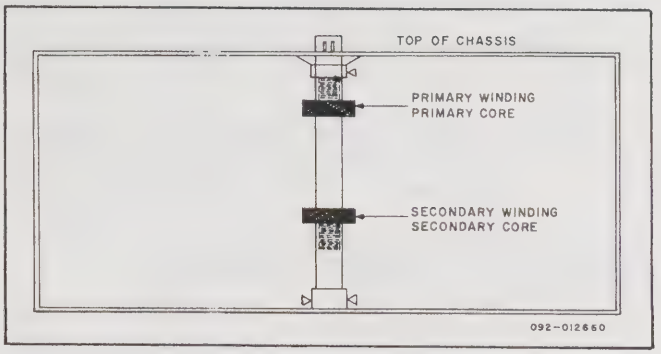


Figure 12. Coil Forms (Antenna and Mixer).

NOTE

Cores may be adjusted from top or bottom of chassis when using an alignment tool such as General Cement's No. 8606.

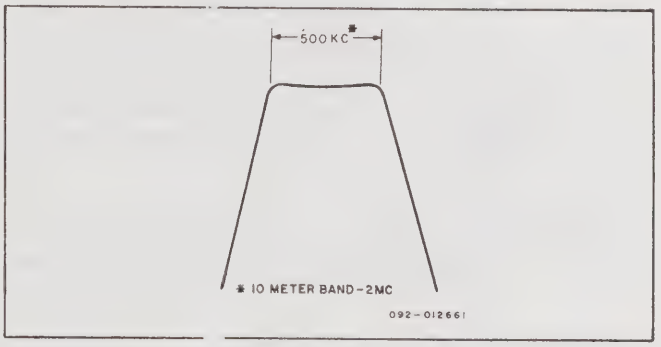


Figure 13. Typical Front-end Response Curve (Except 10-meter Band).

5-6. ALIGNMENT OF BANDPASS ANTENNA AND FIRST MIXER COILS.

No attempt should be made to adjust these coils unless component parts in this circuitry have been replaced, or if the gain appears abnormally low over a portion of a particular band.

Controls should be set as follows:

RF GAIN . . . . . 10 (maximum sensitivity)

AUDIO GAIN. . . . . 10 (maximum output)

AVC . . . . . OFF

FUNCTION. . . . . UPPER-AM

NOTCH . . . . . OFF

CAL. SET . . . . . OFF

ANT. TRIM . . . . . Mid-range (half capacity)

SELECTIVITY . . . 2 KC

The following will apply to all bands except 10 meters. Coil locations are marked on chassis.

a. Connect signal generator to antenna input on receiver using 50-ohm termination.

b. Connect output meter across appropriate speaker terminals.

c. Starting with 80 meters, adjust each band in order of increasing frequency. If it is determined that only one band needs alignment, adjustments should be made only for that band.

d. Set receiver TUNING 25 KC in from the high frequency end of the dial (i.e., 3.975 MC, 7.475 MC, etc.) and adjust signal generator to the same frequency. (Keep generator level as low as possible to avoid receiver overload.)

e. Peak appropriate mixer primary and secondary cores and also antenna primary and secondary cores for maximum receiver output. Repeat to cancel out any interaction between adjustments.

f. Set receiver TUNING to center of dial (i.e., 3.750 MC, 7.250 MC, etc.) and adjust signal generator to the same frequency.

g. With ANT. TRIM set at mid-range, peak the antenna secondary core only (see coil sketch) for maximum receiver output.

h. Retune receiver and signal generator to point 25 KC in from high frequency end of dial. Carefully tune in signal and adjust the ANT. TRIM for maximum receiver output. Observe signal generator level and receiver output level.

i. Tune receiver and signal generator to a point 25 KC in from low frequency end of dial (i.e. 3.525 MC, 7.025 MC, etc.). Keep signal generator level constant, peak ANT. TRIM and observe receiver output level.

j. If receiver output does not equal that obtained at the high frequency end of the dial, turn mixer primary (top) core in very small increments (usually clockwise from top of chassis) until equal output is obtained at both check points.

NOTE

ANT. TRIM should be peaked for maximum receiver output at each check point.

5-7. ALIGNMENT OF 10-METER BANDPASS ANTENNA AND MIXER COILS.

Equipment needed and connections will be the same as described above.

a. Set BAND SELECTOR to 10M-4 (29.5 MC to 30 MC).

b. Adjust receiver TUNING and signal generator to 29.975 MC.

c. With ANT. TRIM at mid-range, peak 10M mixer primary and secondary cores, and 10M antenna primary and secondary cores for maximum receiver output. Repeat to cancel out any interaction between adjustments.

d. Set BAND SELECTOR to 10M-2 (28.5 MC to 29 MC) and adjust receiver TUNING and signal generator to 29 MC.

e. With ANT. TRIM at mid-range, peak 10M antenna secondary only (see coil sketch) for maximum receiver output.

f. Set BAND SELECTOR back to 10M-4 (29.5 MC to 30 MC) and adjust receiver TUNING and signal generator to 29.975 MC. Carefully tune in signal, peak ANT. TRIM, observe signal generator level and receiver output level. level.

g. Set BAND SELECTOR to 10M-1 (28 MC to 28.5 MC) and adjust receiver TUNING and signal generator to 28.025 MC. Carefully tune in signal and peak ANT. TRIM for maximum receiver output.

h. If receiver output does not equal that obtained at 29.975 MC, turn mixer primary core (top) in very small increments until equal output is obtained at both check points (28.025 MC and 29.975 MC).

NOTE

ANT. TRIM should be peaked for maximum receiver output at each check point.

5-8. ADJUSTMENT OF IF TRAP.

Controls should be set as follows:

RF GAIN 10

AUDIO GAIN 10

AVC . . . . . OFF

FUNCTION . . . . . UPPER-AM

NOTCH . . . . . OFF

XTAL CAL.. . . . . OFF

ANT. TRIM . . . . . Mid-range

SELECTIVITY. . . . 2 KC

BAND SELECTOR . 40M

a. Connect signal generator to antenna input.

b. Set receiver TUNING at 7.1 MC.

c. Set signal generator output level at approximately 1000 microvolts and tune to 6.4 MC.

d. Adjust both cores in L2 (IF trap), located on rear apron of chassis, for minimum receiver output. Repeat adjustments until no further decrease in output is obtained.

e. Check for uniform gain at 7.025 MC and 7.475 MC. If gain is not uniform, repeat adjustments as described in paragraph 5-6 on 40-meter band only.

5-9. ADJUSTMENT OF FACTORY GAIN METER CONTROL.

Controls should be set as follows:

AUDIO GAIN . . . . . O

RF GAIN 10

AVC . . . . . ON

FUNCTION . . . . . UPPER-AM

SELECTIVITY . . . 3 KC

TUNING . . . . . 14.3 MC

BAND SELECTOR . 20M

NOTCH . . . . . OFF

XTAL CAL. . . . OFF

a. Connect signal generator to the antenna input. Set generator output level to 50 microvolts unmodulated and tune to 14.3 MC.

b. Carefully adjust TUNING for maximum "S" meter deflection and peak ANT. TRIM.

c. If "S" meter does not read S9, adjust factory gain control for correct reading.

d. Turn RF GAIN control to "O" and check for electrical zero at left end of meter scale.

e. Adjust meter zero as necessary and repeat the above steps until the meter reads S9 with the RF GAIN control at 10 and 0 with the RF GAIN control at 0. Both adjustments are located on top of chassis near the VFO.

5-10. BFO FREQUENCY ADJUSTMENT.

The beat frequency oscillator (BFO) has been adjusted at the factory so that its frequency is exactly 50 KC when the PITCH knob is set at "O". A slight readjustment may be necessary occasionally because of normal component aging. To determine if adjustment is required, proceed as follows:

With the SELECTIVITY control at 5 KC, FUNCTION at UPPER SSB/CW, XTAL CAL. at ON, and PITCH control at "O", adjust TUNING to zero beat at any 100-KC check point. Leaving the receiver TUNING unchanged, switch the FUNCTION switch to LOWER SSB/CW. If the beat oscillator frequency is correct, zero beat will be maintained in both the UPPER and LOWER SSB/CW positions. If the beat oscillator is off frequency, a beat note will be heard when switching from UPPER to LOWER SSB/CW. Adjustment of the oscillator is recommended only if the frequency of the audible beat note exceeds 200 CPS with the PITCH knob at "O".

NOTE

In instances where the beat oscillator is considerably off frequency, it may not be possible to obtain a zero beat when tuning through a signal. If this is the case, it will be necessary to roughly set the BFO to 50 KC as follows: Set SELECTIVITY to .5 KC, FUNCTION to UPPER SSB/CW, and tune receiver to a noisy part of band (not to a signal). Remove the PITCH knob and adjust the BFO slug for minimum noise. Set the SELECTIVITY control to 5 KC and make the BFO frequency check as outlined above.

If the BFO frequency check indicates adjustment is necessary, proceed as follows:

a. Remove the PITCH control knob, turn the BFO slug a few degrees in the direction that lowers the beat note frequency, and repeat the BFO frequency check.

b. Continue varying the setting of the slug in small steps and repeat the BFO frequency check until zero beat is obtained in both UPPER and LOWER SSB/CW positions.

c. After the correct slug setting has been determined, replace the PITCH knob with "O" in the top center position, being careful not to disturb the slug setting.

5-11. NOTCH FREQUENCY AND DEPTH ADJUSTMENTS.

Readjustment of the notch filter circuit is not normally necessary unless the components in the notch circuit are replaced. To check the circuit, proceed as follows:

a. Check the BFO frequency as previously described so that zero beat is maintained in either sideband position.

b. Set FUNCTION to UPPER SSB/CW, SELECTIVITY to 3 KC and AVC to ON, and tune in an unmodulated signal (strength approximately S9) to zero beat.

c. Switch FUNCTION to UPPER AM.

d. Tune NOTCH control for minimum "S" meter indication.

e. Adjust notch depth (on top of chassis, right side of VFO) for further decrease in "S" meter reading.

f. Repeat steps "d" and "e" until no further decrease in meter reading is noted. At this point, the notch frequency should indicate 50 KC.

If the notch frequency does not indicate 50 KC with the receiver at zero beat as described above, loosen knob and reset it to 50 KC.

5-12. CRYSTAL CALIBRATOR ADJUSTMENT.

The crystal adjust trimmer is located near the power transformer on top of chassis and is used to adjust the 100-KC crystal exactly to frequency by comparison with the 10-MC signal transmitted by WWV.

a. Set all receiver controls for AM reception, set BAND SELECTOR to WWV, and adjust TUNING to WWV signal (WWV mark on dial).

b. During the period of no signal modulation, turn XTAL CAL. ON and carefully set the crystal adjust so that the crystal calibrator zero beats with the signal received from WWV.

NOTE

If this adjustment is attempted during periods that WWV is modulated, an erroneous zero beat may be obtained with the modulating frequency instead of the desired carrier frequency.

5-13. VFO CALIBRATION ALIGNMENT.

If the electrical index check at the 100-KC check points on all bands shows that the large dial calibration marks consistently fall to one side of the top pointer, a trimmer adjustment is indicated.

Proceed as follows:

a. Mechanically index dial by tuning exactly to the lowest frequency calibration mark on main dial (i.e., 3.5 MC, 7.0 MC, etc.). The small kilocycle dial should read "O" at this point. If it does not, turn until kilocycle dial does read "O" and rotate CAL. SET to LOCK. Adjust TUNING until main dial is exactly at the low band edge and release CAL. SET LOCK.

b. Place FUNCTION to UPPER SSB/CW, SELECTIVITY to 3 KC, AVC to ON, and XTAL CAL. to ON.

c. Loosen locknut on C54 (top of VFO) and carefully adjust C54 in very small

increments until zero beat is heard. Care should be exercised to make sure that the correct 100-KC beat note is tuned in with the trimmer.

d. Check across the dial at the 100-KC check points. If the frequency error is less than 1000 cycles, the calibration will be within acceptable limits. If the error at the high frequency end of the dial (i.e., 4.0 MC, 7.5 MC, etc.) is greater than 1000 cycles, the VFO may require a coil adjustment in addition to the trimmer adjustment.

5-14. CONDITION REQUIRING COIL AND TRIMMER ADJUSTMENT.

If the dial error progressively increases in the same direction with the high frequency end point running more than 1000 cycles in error, then adjust both L27 and C105 as follows:

a. Mechanically index the VFO as previously described.

b. Adjust TUNING exactly to high frequency end of dial (i.e., 4.0 MC, 7.5 MC, etc.) and adjust L27 to zero beat.

c. Adjust TUNING exactly to low frequency end of band and adjust C54 for zero beat.

d. Repeat steps "b" and "c" until zero beat is obtained exactly at "O" at both ends of the dial.

e. Check across the dial at the 100-KC points. If the frequency error is less than 1000 cycles, the VFO calibration is within acceptable limits. If the error exceeds 1000 cycles at any of the mid-points, with the end points at zero error, the VFO condenser should be knifed in. This operation should not be attempted by other than qualified personnel thoroughly familiar with the technique.

NOTE

A receiver covering 5.0 MC to 5.5 MC and having a 100-KC calibrator will be very useful in adjusting the VFO calibration. With the Model SX-115 dial set at the high frequency end (i.e., 4.0 MC, 7.5 MC, etc.), the VFO frequency will be 5.0 MC. L27 is adjusted at this frequency. With the Model SX-115 dial set at 3.5 MC, 7.0 MC, etc., the VFO frequency will be 5.5 MC. Adjust C54 at this point.

5-15. ADJUSTMENT OF T11 (AVC AMPLIFIER CIRCUIT).

Controls should be set as follows:

RF GAIN 10

AUDIO GAIN 0

AVC . . . . . ON

SELECTIVITY . . . 3 KC

FUNCTION . . . . . UPPER SSB/CW

BAND SELECTOR . 20M

NOTCH . . . . . OFF

XTAL CAL. . . . . ON

Adjust TUNING for maximum "S" meter deflection at any 100-KC check point (antenna disconnected). Back core fully out of coil (T11) by turning counterclockwise until core stops. As the core is turned clockwise into the coil, the "S" meter will gradually decrease and suddenly show a slight increase in reading. This will be the correct adjustment point.

NOTE

The exposed screw threads should measure approximately 3/4 inch at this point.

SECTION VI

SERVICE DATA

6-1. 50.75-KC IF SYSTEM.

Figure 14 shows the type of coupling used in the 50.75-KC IF system. Note that inductive coupling is avoided by careful shielding of the IF coils and signal transfer occurs only through capacitance and resistance. By increasing the value of "C" and decreasing "R", the selectivity is made sharper; by decreasing "C" and increasing "R", the selectivity is made broader. The proper values of "C" and "R" are switched in the circuit by means of the SELECTIVITY control. "R" varies the "Q" of the tuned circuit and "C" varies the coupling. This R-C coupling arrangement affords a more accurate means of selectivity control than that readily obtainable by any other method.

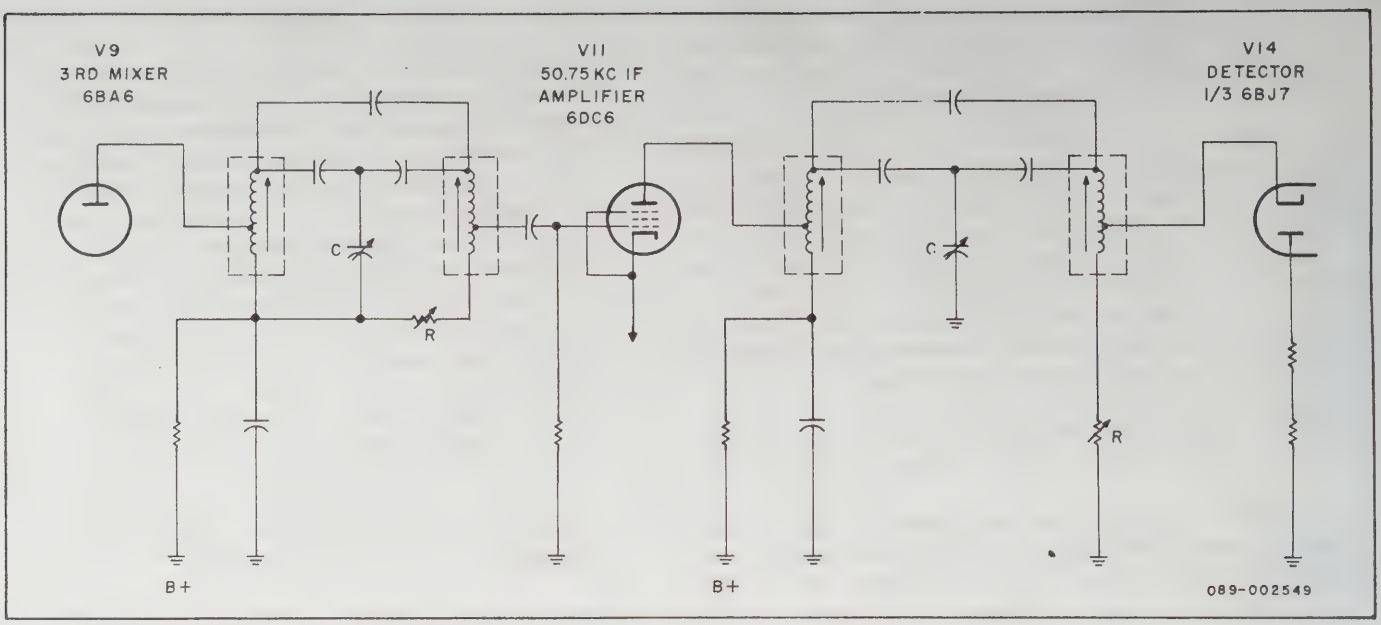


Figure 14. Equivalent Schematic Diagram of the 50.75-KC IF System.

6-2. CHASSIS REMOVAL.

The chassis and front panel assembly are removable from the cabinet as a unit by removing the two screws (top & bottom) at each side of the front panel and the three screws on the underside of the cabinet.

6-3. TUBE AND DIAL LAMP REPLACEMENT.

To gain access to the tubes and dial lamps, raise the hinged top cover of the cabinet. The tube locations and their functions are shown in figure 16.

6-4. RESTRINGING DIAL POINTER MECHANISM.

Remove the chassis from the cabinet (see paragraph 6-2). The procedure for restringing the pointer drive is as follows:

1. Remove the front panel from the chassis by removing knobs (bristol wrench), jacks, meter connections, and two screws from each side of the panel.
2. Remove the band selector dial.
3. Make up dial cord as shown in figure 15.
4. Rotate the BAND SELECTOR control shaft maximum clockwise.
5. Place the loop at the end of the dial cord over the pin (1) on the drum. Following the numerical sequence and arrows as shown in figure 15, string the dial cord and anchor the spring in the chassis hole provided. Select the spring in the chassis hole providing the required tension.
6. Check the spring clearance at the bottom pulley by rotating the BAND SELECTOR shaft fully counterclockwise; the end of the spring should just clear the lower idler pulley and the track mounting screw. This clearance can be obtained by loosening and resetting the drum on the BAND SELECTOR shaft.
7. Rotate the BAND SELECTOR shaft fully clockwise. Place the pointer assembly on the pointer track and engage the dial cord in the clips. Align the top of the pointer with the top of the calibration figure on the 80-meter band (3500 KC to 4000 KC).
8. Replace the band selector dial and index it in the 80-meter position.
9. Rotate the BAND SELECTOR control shaft fully counterclockwise to the 10-meter band (29.5 MC to 30.0 MC) being careful not to shift the pointer along the cord. At the end of travel, the pointer should just clear (and be in line with) the fixed pointer at the dial edge. The pointer must also line up with the center of the dial shaft. This can be adjusted by loosening the pointer-track mounting screws and shifting the track as required.

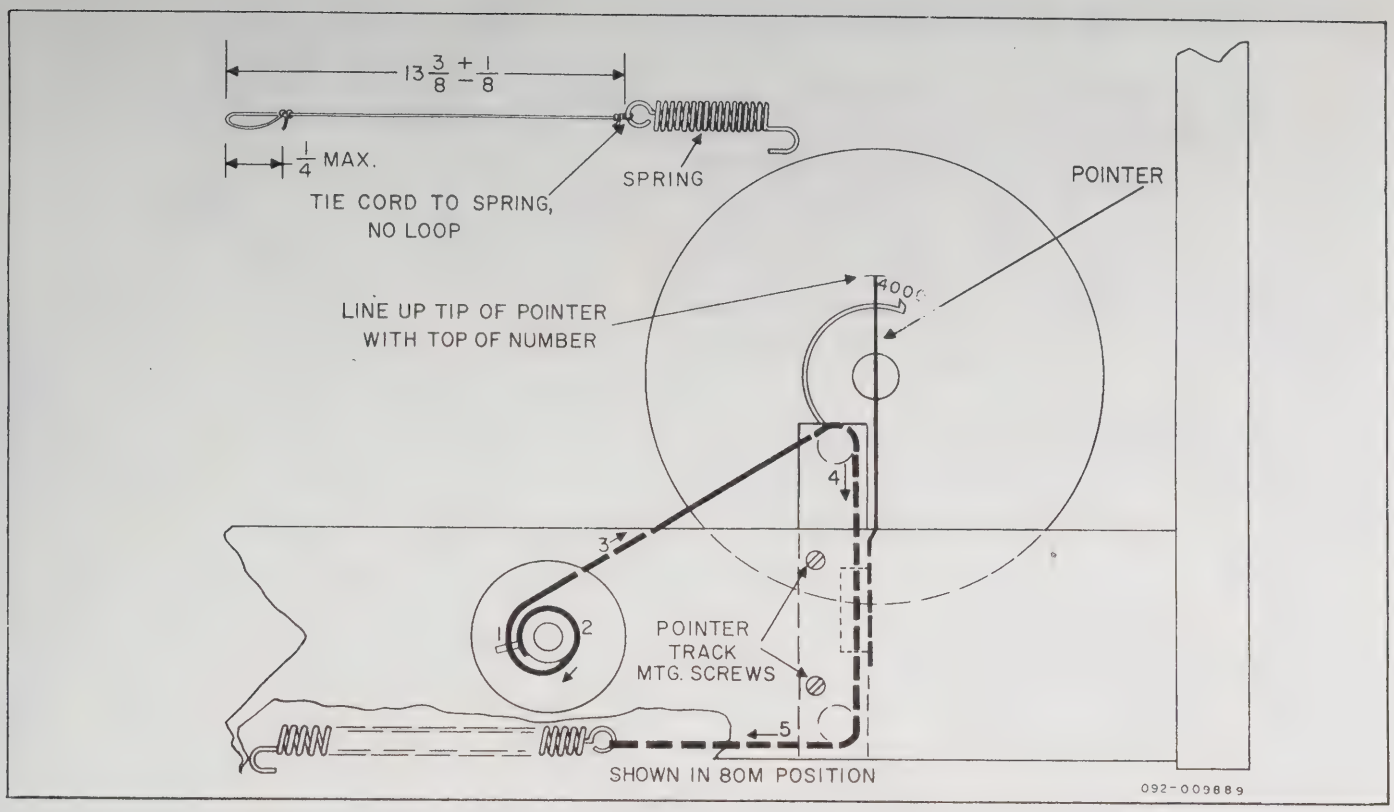


Figure 15. Dial Cord Restringing.

10. Rotate the BAND SELECTOR control shaft fully clockwise. Clinch the pointer clips on the dial cord and apply a drop of household cement to each to prevent slippage. Check the pointer operation. If side play is evident, check the bearing points of the pointer saddle. Bearing pressure on all four points should be light and even for smooth operation.

11. Reassemble the front panel and install the chassis in the cabinet.

TROUBLE SHOOTING CHART

Symptom	Possible Cause
No output on one sideband	Check V10, incorrect crystal activity adjustment T8 (see Alignment of 955-KC and 1055-KC Third Conversion Oscillators)
No output on one band segment	Incorrect core adjustment (see Adjustment of Crystal Controlled First Conversion Oscillator)
No output SSB/CW only	Check V15 and V16
No output AM only	Check V14
No "S" meter indication	Check V13
No Crystal Calibrator Signal	Check V1
"S" meter reads but no output	Check V15, V16, and V17; shorted speaker terminals; defective speaker
Weak and distorted audio	3.2-ohm and 500-ohm speaker terminals shorted or speaker connected to wrong terminals

6-5. SERVICE OR OPERATION QUESTIONS.

For any further information regarding operation or servicing of the receiver, contact the Hallicrafters dealer from whom the receiver was purchased. The Hallicrafters Company maintains an extensive system of authorized service centers where any required service will be performed promptly and efficiently at nominal charge. All Hallicrafters Authorized Service Centers display the sign shown at right. For the location of the one nearest you, consult your telephone directory.

Do not make any service shipments to the factory unless instructed to do so by letter. The Hallicrafters Company will not accept the responsibility for any unauthorized shipments.

The Hallicrafters Company reserves the privilege of making revisions in current production of equipment and assumes no obligation to incorporate these revisions in earlier models.

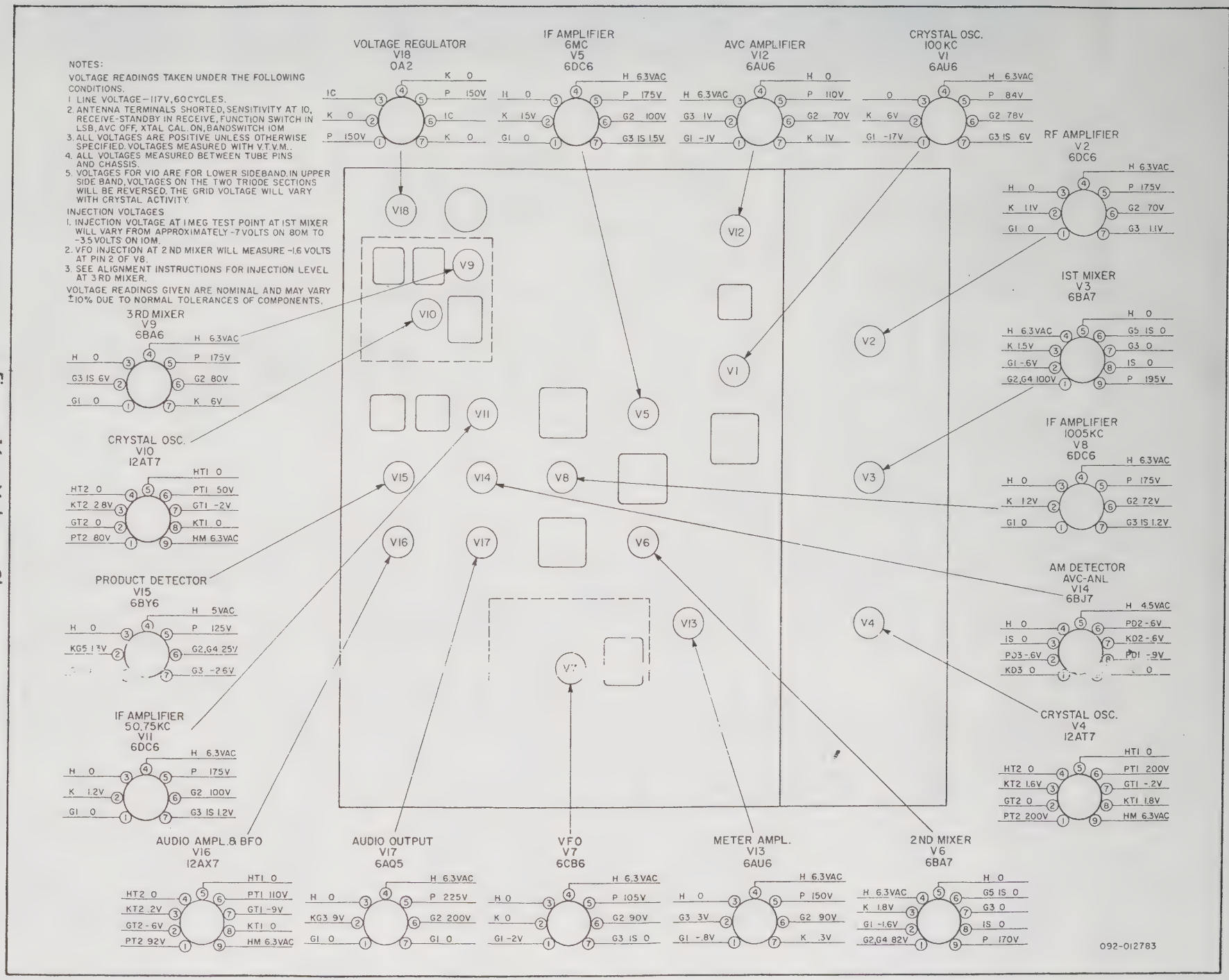


Figure 16. Voltage Chart.

SERVICE REPAIR PARTS LIST

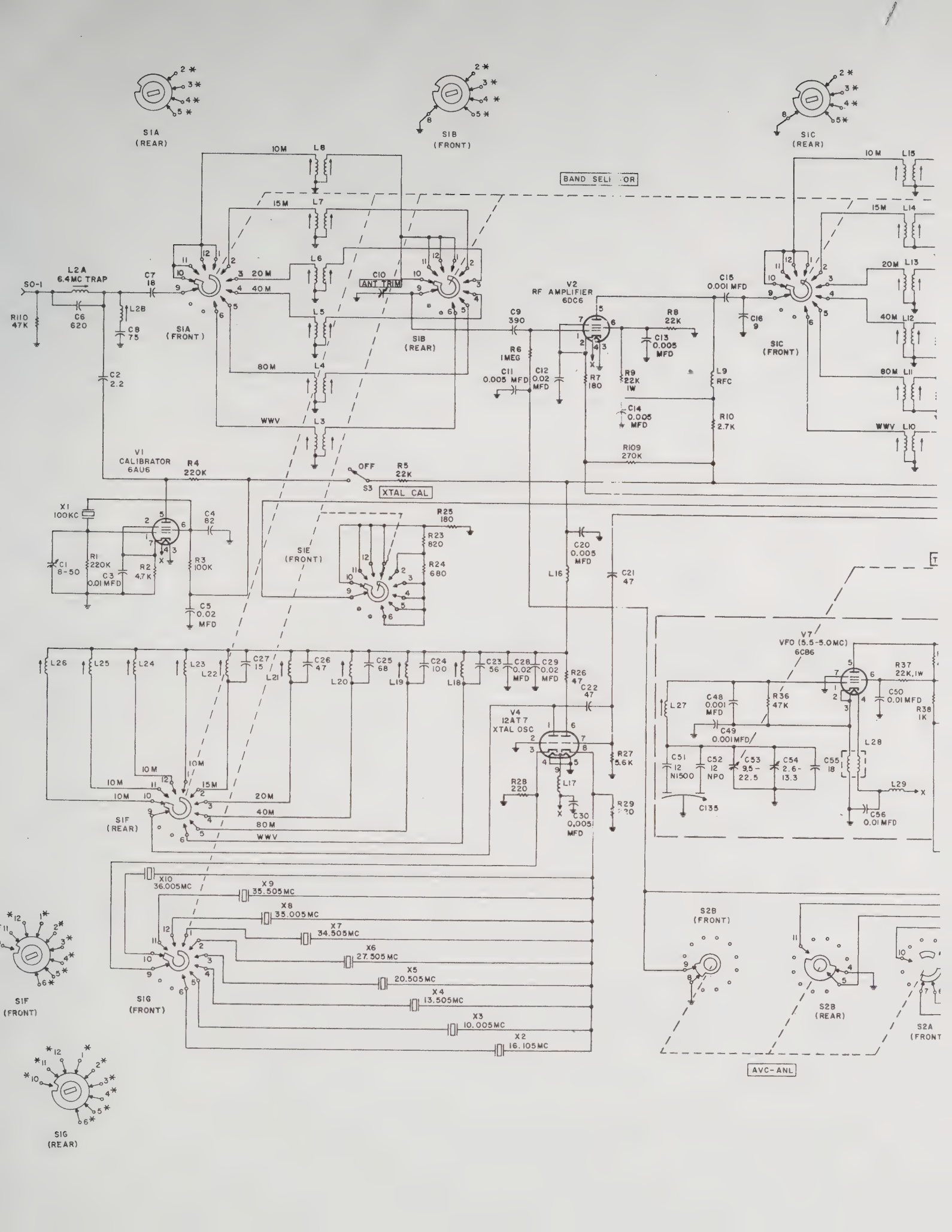
Schematic Symbol	Description	Hallicrafters Part Number
	CAPACITORS	
C1	Variable, Trimmer, 8 mmf to 50 mmf, N750	044-200437
C2, 70, 85	2.2 mmf, 10%, Composition	047-200403-04
C3, 34, 35 38, 56, 58, 59, 62, 74, 76, 77, 101, 102, 110, 113, 134	0.01 mfd, +80%, -20%, 500V, Ceramic Disc	047-100224
C4	82 mmf, 2%, 300V, Duramica	481-161820
C5, 12, 28, 29, 36, 40, 63, 64, 66, 67, 73, 75, 81, 86, 103, 106, 118, 133, 137, 139	0.02 mfd, +80%, -20%, 500V, Ceramic Disc	047-100242
C6	620 mmf, 5%, 300V, Duramica	481-162621
C7	18 mmf, 5%, 300V, Duramica	481-132180
C8	75 mmf, 5%, 300V, Duramica	481-162750
C9	390 mmf, 5%, 300V, Duramica	481-162391
C10	Variable, ANT. TRIM	048-000505
C11, 13, 14, 18, 19, 20, 30, 31, 115	0.005 mfd, GMV, 500V, Ceramic Disc	047-100168
C15	0.001 mfd, GMV, 500V, Ceramic Disc	047-200230
C16	9 mmf, ±0.5 mmf, 300V, Duramica	481-135090
C17	470 mmf, 5%, 300V, Duramica	481-162471
C21, 22	47 mmf, 5%, 500V, N3300, Ceramic Tubular	479-035470
C23	56 mmf, 5%, 300V, Duramica	481-162560
C24	100 mmf, 5%, 300V, Duramica	481-162101
C25	68 mmf, 5%, 300V, Duramica	481-162680
C26	47 mmf, 5%, 300V, Duramica	481-152470
C27	15 mmf, 5%, 300V, Duramica	481-132150
C32, 37	175 mmf, 5%, 300V, Duramica	493-121750-224
C33A, B	Variable, Tuning	048-000506
C39, 41, 60, 61, 71, 72	560 mmf, 5%, 300V, Duramica	481-162561
C42, 82	0.22 mfd, 10%, 200V, Tubular Mylar	046-001298-04
C43, 116, 136	15 mmf, 2%, 300V, Duramica	481-131150
C44	6 mmf, 10%, NPO, Ceramic Tubular	491-006060-22
C45, 46	47 mmf, 5%, N80, Ceramic Tubular	491-105470-42
C47, 114, 125, 140	470 mmf, 2%, 300V, Duramica	481-161471
C48, 49	0.001 mfd, 5%, 300V, Mica	047-100623
C50, 57	0.01 mfd, 10%, 300V, Mica	470-643103
C51	12 mmf, 5%, N1500, Ceramic Tubular	479-015120
C52	12 mmf, 5%, NPO, Ceramic Tubular	491-005120-22
C53	Variable, TUNING, 9.5 mmf to 22.5 mmf	048-000481
C54	Variable, Trimmer, 2.6 mmf to 13.3 mmf	048-200376
C55	18 mmf, 5%, N80, Ceramic Tubular	491-005180-42
C65	100 mmf, 10%, N750, Ceramic Tubular	491-026101-94
C68, 69	390 mmf, 5%, 500V, Duramica	482-262391
C78, 97, 107	220 mmf, 2%, 300V, Duramica	481-161221
C79, 80	7500 mmf, 5%, 500V, Mica	470-422752
C83, 84	390 mmf, 2%, 300V, Duramica	481-161391
C87, 90	0.0047 mfd, 10%, 500V, Ceramic Disc	047-001506
C88, 89, 91, 92	0.01 mfd, 10%, 500V, Ceramic Disc	047-001505
C93	5.6 mmf, 2%, 300V, Duramica	481-131056
C94, 95, 119	0.1 mfd, +80%, -20%, 50V, Ceramic Disc	047-001146
C96, 98, 105, 109, 120, 126, 127	0.001 mfd, 20%, 500V, Ceramic Disc	047-100503
C99	0.047 mfd, 10%, 200V, Tubular Mylar	046-001290-04
C100	0.47 mfd, 10%, 200V, Tubular Mylar	046-001302-04
C104, 108	0.05 mfd, 50V, Ceramic Disc	047-001144
C111	0.0022 mfd, 10%, 400V, Tubular Mylar	046-001308-04
C112	300 mmf, 2%, 300V, Duramica	481-161301
C117	330 mmf, 2%, 300V, Duramica	481-161331
C121, 124	100 mmf, 2%, 300V, Duramica	481-161101
C122	560 mmf, 2%, 300V, Duramica	481-161561
C123	10 mmf, ±0.5 mmf, N4700, Ceramic Tubular	479-042100
C128	10 mfd, 50V, Electrolytic	045-000755
C129A, B, C	60 mfd, 450V; 20 mfd, 450V; 20 mfd, 400V; Electrolytic	045-200113
C130	0.22 mfd, 10%, 200V, Molded Tubular	499-011224
C131, 132	0.01 mfd, 1400V, Ceramic Disc	047-200752
C135	Variable, Differential	048-200375
C138	0.01 mfd, 20%, 500V, Ceramic Disc	047-100354
	RESISTORS*	
R1, 4, 70, 79, 94	220K Ohm	451-252224
R2	4700 Ohm	451-252472
R3, 39, 47, 48, 49, 50, 51, 72, 86	100K Ohm	451-252104
R5, 8, 11, 14, 17, 21, 31, 41, 46	22K Ohm	451-252223
R6, 19, 54, 65, 75, 80	1 Megohm	451-252105
R7, 25, 30, 40, 55, 59, 62, 96	180 Ohm	451-252181
R9, 37, 42	22K Ohm, 1 watt	451-352223
R10, 20, 22, 43, 69	2700 Ohm	451-252272
R12, 77	39K Ohm	451-252393
R13, 36, 68, 85, 88, 91, 92, 107, 110	47K Ohm	451-252473
R15, 73, 97, 98	470K Ohm	451-252474
R16	120 Ohm	451-252121
R18, 32	10K Ohm, 2 watt	451-652103
R23	820 Ohm	451-252821
R24	680 Ohm	451-252681
R26	47 Ohm	451-252470
R27, 100	5600 Ohm	451-252562
R28, 29	220 Ohm	451-252221
R33	2700 Ohm, 1 watt	451-352272
R34	4700 Ohm, 1 watt	451-352472
R35	3900 Ohm	451-252392
R38, 58, 90	1K Ohm	451-252102
R44	2200 Ohm	451-252222
R45	120K Ohm	451-252124
R52	8200 Ohm	451-252822
R53	5000 Ohm, Variable (NOTCH DEPTH)	025-201716
R56	39K Ohm, 1 watt	451-352393
R57	3300 Ohm	451-252332
R60, 63	220 Ohm	451-252221
R61, 64	390 Ohm	451-252391
R66	330 Ohm	451-252331
R67	180K Ohm	451-252184
R71	2.2 Megohm	451-252225
R74	2 Megohm, Variable (S Meter Sens.)	025-001957
R76	200 Ohm, Variable (S Meter Adj.)	025-001990
R78, 87	150K Ohm	451-252154
R81	820K Ohm	451-252824
R82, 83, 109	270K Ohm	451-252274
R84, 89	3.3 Ohm, 1 watt	451-252033
R93	500K Ohm, Variable (AUDIO GAIN)	025-001955
R95	15 Megohm	451-252156
R99	270 Ohm, 1 watt	451-352271
R101	47 Ohm, 1 watt	451-352470
R102	1500 Ohm, 5 watt, W.W.	453-042152
R103	6800 Ohm	451-252682
R104	330K Ohm	451-252334
R105	10K Ohm, 2W, Variable (RF GAIN)	025-001956
R106	2000 Ohm, 8 watt, Candohm	024-101258
R108	33 Ohm, 2 watt	451-652330

* All RESISTORS carbon type, 10%, 1/2 watt, unless otherwise stated.

	COILS	
L2A, B	IF Trap	050-000771
L3	Antenna (WWV)	051-003093
L4	Antenna (80M)	051-003091
L5	Antenna (40M)	051-003092
L6	Antenna (20M)	051-003094
L7	Antenna (15M)	051-003095
L8	Antenna (10M)	051-003096
L9	RF Choke, 2.5MH	053-200335
L10	Mixer (WWV)	051-003099
L11	Mixer (80M)	051-003097
L12	Mixer (40M)	051-003098
L13	Mixer (20M)	051-003100
L14	Mixer (15M)	051-003101
L15	Mixer (10M)	051-003102
L16, 33	RF Choke, 0.7MH	053-000530
L17	Filament Choke	053-200427
L18	Oscillator (WWV)	051-003105
L19, 23	Oscillator (80M and 10M)	051-003103
L20, 24	Oscillator (40M and 10M)	051-003104
L21, 26	Oscillator (20M and 10M)	051-003106
L22, 25	Oscillator (15M and 10M)	051-003107
L27	VFO	051-202180
L28	VFO Filament	053-200359
L29	Filament Choke	053-200427
L30	RF Choke, 540UH	053-100107
L31, 32	RF Choke	053-200008
L34	Bridge T (NOTCH FREQ)	051-202270
L35	Filter Choke	056-000456
L36	BFO (PITCH)	054-200053
	TRANSFORMERS	
T1, 2	IF (6-6.5MC)	050-000770
T3	VFO Band Pass Filter	050-200679
T4, 5	IF (1005KC)	050-000768
T6, 7, 9, 10, 11	IF (50.75KC)	050-200735
T8	Oscillator (955-1055KC)	050-000769
T12	Audio Output	055-000449
T13	Power	052-000883
	CRYSTALS	
X1	100KC, Quartz	019-002712
X2	16.105MC, Quartz	019-002729
X3	10.005MC, Quartz	019-002727
X4	13.505MC, Quartz	019-002728
X5	20.505MC, Quartz	019-002730
X6	27.505MC, Quartz	019-002731
X7	34.505MC, Quartz	019-002732
X8	35.005MC, Quartz	019-002733
X9	35.505MC, Quartz	019-002734
X10	36.005MC, Quartz	019-002735
X11, 12	955-1055KC (Matched Pair)	019-002719
	DIODES	
CR1, 2, 3	HD6225	019-002354
CR4, 5	Silicon	019-C02634

SERVICE REPAIR PARTS LIST (CONT.)

Schematic Symbol	Description	Hallicrafters Part Number
	SWITCHES	
S1	BAND SELECTOR	----------
S1A	Wafer	062-000185
S1B	Wafer	062-000186
S1C	Wafer	062-000185
S1D	Wafer	062-000186
S1E	Wafer	062-000187
S1F	Wafer	062-000189
S1G	Wafer	062-000188
S2	Rotary, AVC-ANL	060-002305
S3	Toggle, XTAL-CAL	060-002314
S4	Rotary, FUNCTION	060-002279
S5	Rotary, SELECTIVITY	060-002370
S6	Toggle, RECEIVE-STANDBY	060-002313
	TUBES	
V1, 12, 13	6AU6 Calibrator, AVC Amplifier, Meter Tube	090-900808
V2, 5, 8, 11	6DC6 RF Amplifier, 1st IF, 2nd IF, 50.75KC IF	090-901328
V3, 6	6BA7 Mixer, 1st & 2nd	090-900815
V4, 10	12AT7 Crystal Osc. & 3rd Conversion Oscillator	090-900034
V7	6CB6 VFO	090-901115
V9	6BA6 3rd Mixer	090-901112
V14	6BJ7 AM Det., AVC-ANL	090-901113
V15	6BY6 SSB-CW Detector	090-901114
V16	12AX7 Audio Amp.-BFO	090-900038
V17	6AQ5 Audio Output	090-901331
V18	OA2 Voltage Regulator	090-900001
	KNOBS	
	Knob, Function	015-001730
	Knob, Audio Gain	015-001732
	Knob, Selectivity	015-001731
	Knob, Notch	015-001651
	Knob, Pitch	015-001650
	Knob, ANL-AVC	015-001649
	Knob, RF Gain	015-001647
	Knob, Ant. Trim	015-001646
	Knob, Tuning & Band Selector	015-001593
	Knob, Xtal Cal.	015-200835
	Knob, Cal. Set	015-001543
	MISCELLANEOUS	
	Button Plug, Plastic	017-000479
	Cabinet Front Assembly	150-000480
	Cabinet Rear Assembly	150-000501
	Cabinet Top Assembly	150-000500
	Cam Assembly, Main Tuning	077-200951
SO1	Connector, Coaxial	010-100056
	Cam Block, Dial Lock	073-004120
	Detent, Band Selector Switch	061-000028
	Dial Cord	038-000049
	Dial Light Socket Assembly	086-000570
	Dial Scale, Calibrated (Band Selector)	083-000940
	Dial Scale, Calibrated (Main Tuning)	083-000939
	Dial Scale, Main Tuning	083-000774
	Drum, Band Selector Cord	028-000405
	Escutcheon	007-000811
	Foot, Mounting	016-100029
	Front Panel	068-001112
	Fuseholder	006-100451
	Glass, Dial	022-000631
	Hinge, Piano type	030-000730
	Hub, Dial Scale	077-002473
	Hub, Tuning Dial	077-002695
SO3	Jack, Shorting type	036-100002
	Line Cord	087-203577
	Lock, Line Cord	076-100953
M1	Meter, Carrier Level	082-000504
	Plate, Meter Mounting	063-005190
	Plug, Auxiliary	035-100003-01
	Pointer, Band Selector	082-000485
	Pointer, Main Tuning	082-000474
	Pointer Slide Assembly	150-002152
	Retainer, C-Washer	076-100611
	Ring, Retaining	076-100552
	Shaft, Band Selector Gear	074-002438
	Shaft, Function Switch	074-002440
	Shaft, Selectivity Switch	074-002441
	Shaft, Tuning Dial Lock	074-002621
	Shield, Electron Tube V1, V2, V5, V7, V8, V9, V11, V12, V13, V15	069-201191
	Shield, Electron Tube V3, V6	069-201189
	Shield, Electron Tube V4, V10, V14, V16	069-201190
	Shield, Pilot Light	086-100037
	Socket, Crystal	006-000971
	Socket, Crystal	006-100320
	Socket, Electron Tube, 7-Pin	006-200633
	Socket, Electron Tube, 7-Pin	006-100644
	Socket, Electron Tube, 7-Pin Ceramic	006-100354
	Socket, Electron Tube, 7-Pin w/Shield	006-200759
	Socket, Electron Tube, 9-Pin w/Shield	006-200672
SO2	Socket, Octal (Auxiliary Socket)	006-200296
	Spring, Compression	075-000800
	Spring, Crystal Retaining	075-000814
	Spring, Dial Lock	075-000807
	Spring, Tension	075-000768
	Window, Dial (Band Selector)	022-000625
	Window, Dial (Main Tuning)	022-000638


S1A (REAR)
S1B (FRONT)
S1C (REAR)
BAND SELECTOR
10M L8
15M L7
20M L6
40M L5
80M L4
WWV L3
10M L15
15M L14
20M L13
40M L12
80M L11
WWV L10
S1A (FRONT)
S1B (REAR)
S1C (FRONT)
ANT TRIM
S0-1
L2A 6.4MC TRAP
L2B
C6 620
C7 18
C8 75
C2 2.2
R110 47K
V1 CALIBRATOR 6AU6
R4 220K
OFF
S3
R5 22K
XTAL CAL
X1 100KC
C1 8-50
R1 220K
C3 0.01 MFD
R2 4.7K
R3 100K
C4 82
C5 0.02 MFD
V2 RF AMPLIFIER 6DC6
C9 390
R6 1MEG
C11 0.005 MFD
C12 0.02 MFD
R7 180
R8 22K
C13 0.005 MFD
R9 22K 1W
C14 0.005 MFD
R10 2.7K
R109 270K
L9 RFC
C15 0.001 MFD
C16 9
S1E (FRONT)
R25 180
R23 820
R24 680
C20 0.005 MFD
C21 47
L16
L26 L25 L24 L23 L22 L21 L20 L19 L18
C27 15
C26 47
C25 68
C24 100
C23 56
C28 0.02 MFD
C29 0.02 MFD
R26 47
C22 47
V4 12AT7 XTAL OSC
R27 5.6K
R28 220
L17
C30 0.005 MFD
R29 220
S1F (REAR)
10M
15M
20M
40M
80M
WWV
X10 36.005MC
X9 35.505MC
X8 35.005MC
X7 34.505MC
X6 27.505MC
X5 20.505MC
X4 13.505MC
X3 10.005MC
X2 16.105MC
S1F (FRONT)
S1G (FRONT)
S1G (REAR)
V7 VFO (5.5-5.0MC) 6C86
L27
C48 0.001 MFD
C49 0.001MFD
R36 47K
R37 22K, 1W
C50 0.01 MFD
R38 1K
L28
C51 12 N1500
C52 12 NPO
C53 9.5-22.5
C54 2.6-13.3
C55 18
C135
L29
C56 0.01 MFD
S2B (FRONT)
S2B (REAR)
S2A (FRONT)
AVC-ANL

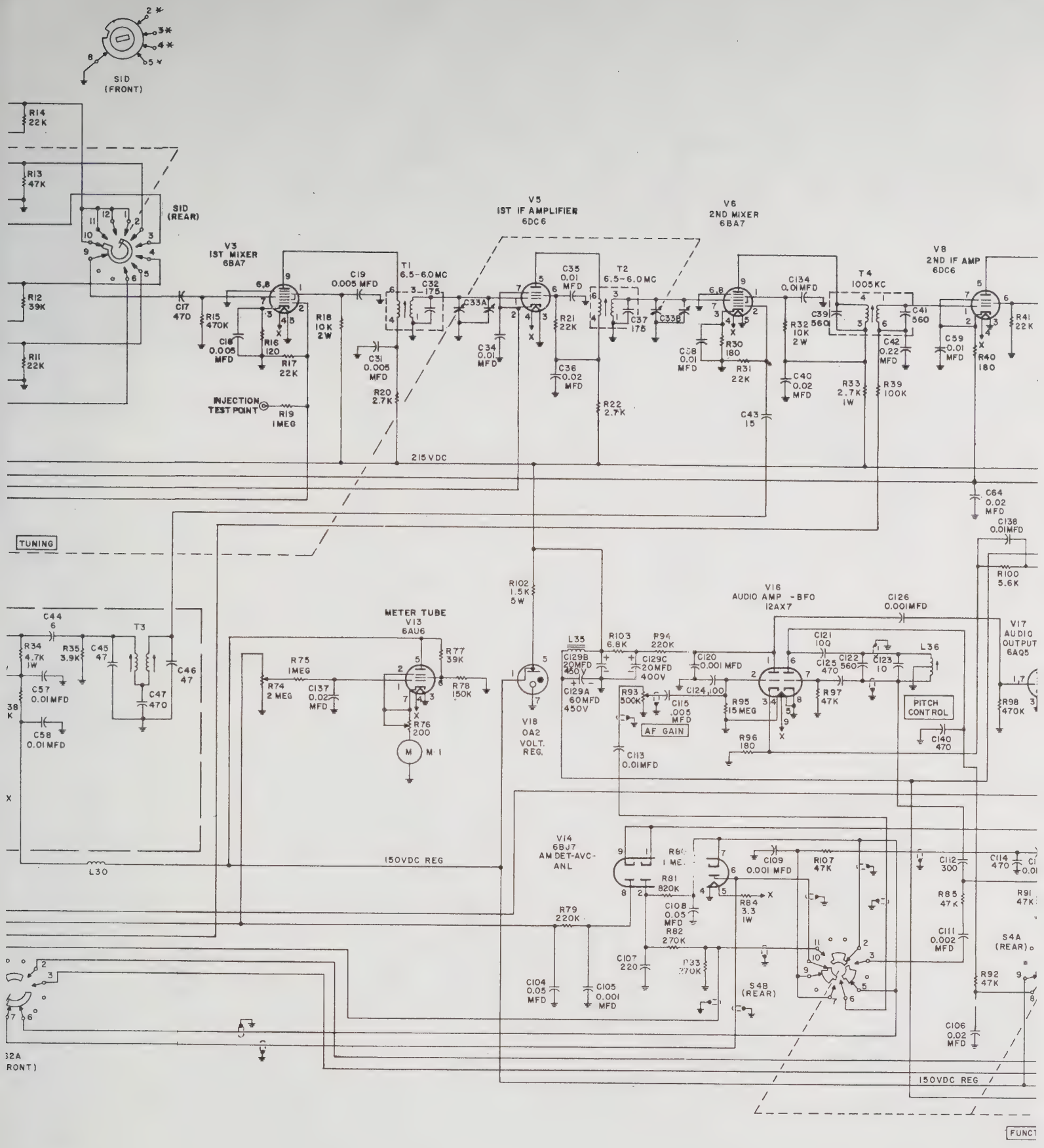
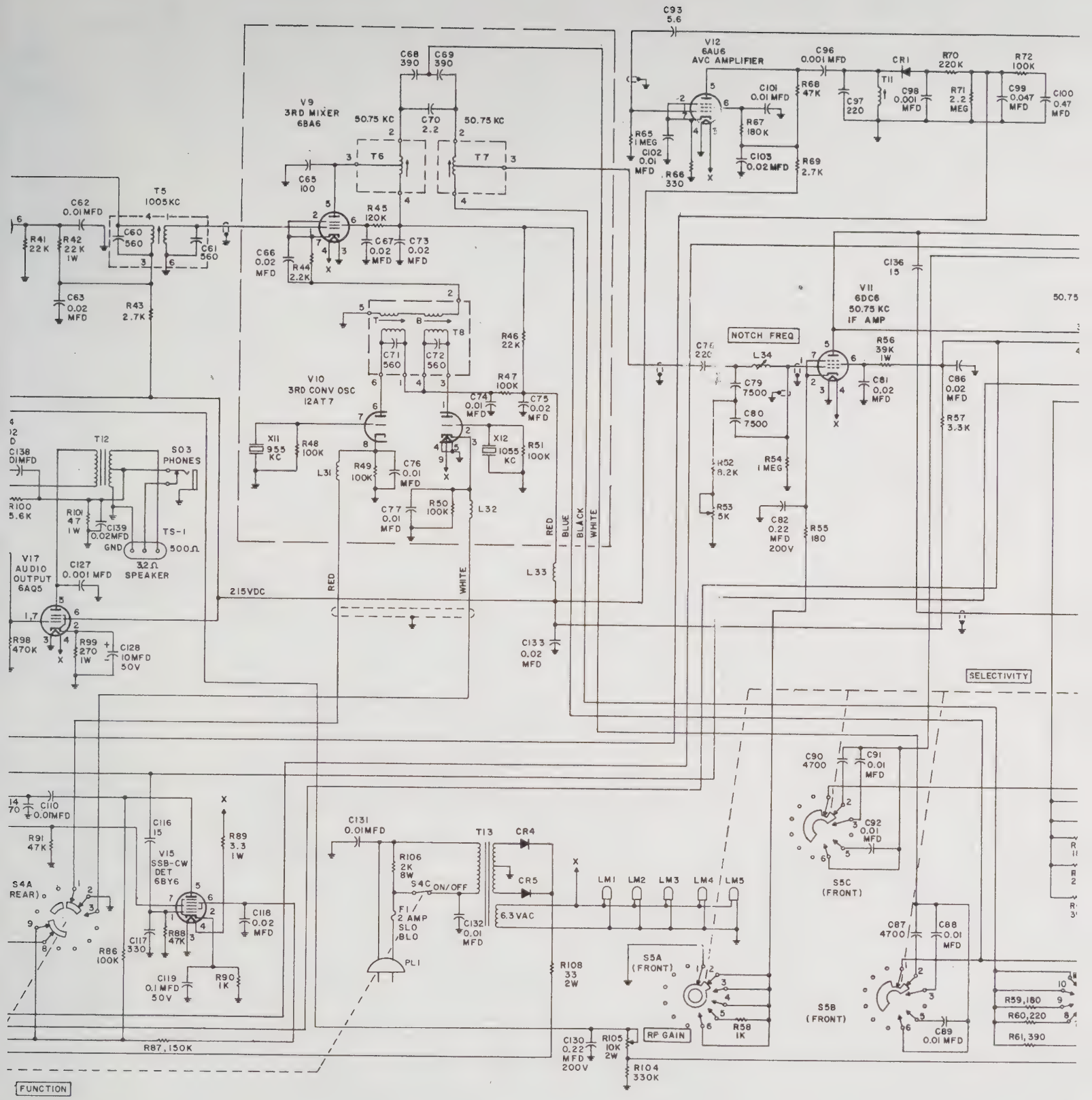
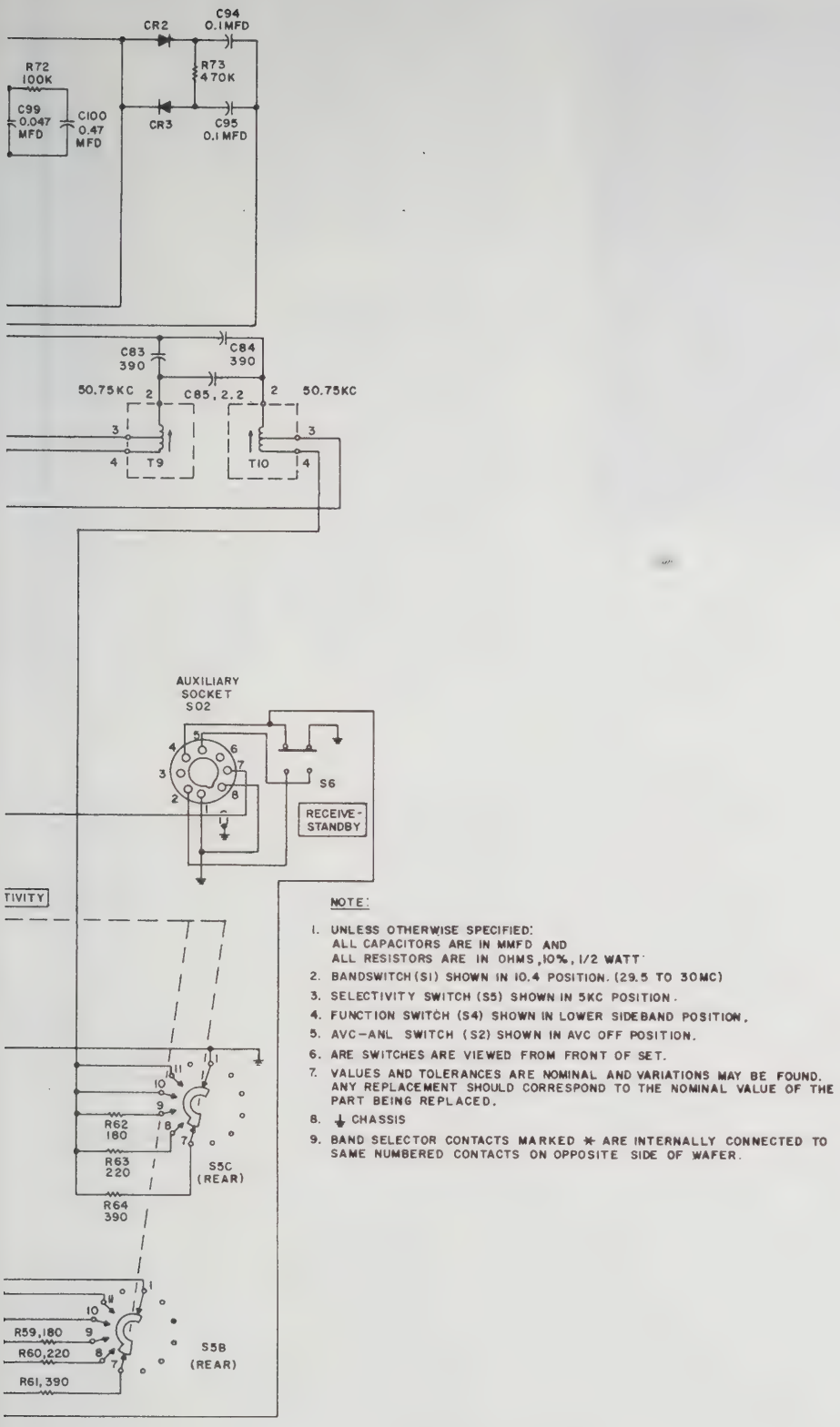


Figure 17. Schematic Diagram of the Receiver.


C93 5.6
V12 6AU6 AVC AMPLIFIER
C96 0.001 MFD
CR1
R70 220K
R72 100K
C68 390
C69 390
V9 3RD MIXER 6BA6
50.75 KC
C70 2.2
T6
T7
C65 100
C101 0.01 MFD
R68 47K
C97 220
T11
C98 0.001 MFD
R71 2.2 MEG
C99 0.047 MFD
C100 0.47 MFD
R65 1 MEG
C102 0.01 MFD
R66 330
R67 180K
C103 0.02 MFD
R69 2.7K
T5 1005KC
C62 0.01 MFD
R41 22K
R42 22K 1W
C60 560
C61 560
C63 0.02 MFD
R43 2.7K
R45 120K
C66 0.02 MFD
R44 2.2K
C67 0.02 MFD
C73 0.02 MFD
T8
C71 560
C72 560
R46 22K
R47 100K
V10 3RD CONV OSC 12AT7
C74 0.01 MFD
C75 0.02 MFD
X11 955 KC
R48 100K
X12 1055 KC
R51 100K
L31
R49 100K
C76 0.01 MFD
C77 0.01 MFD
R50 100K
L32
C136 15
V11 6DC6 50.75 KC IF AMP
NOTCH FREQ
L34
R56 39K 1W
C79 7500
C80 7500
C81 0.02 MFD
C86 0.02 MFD
R57 3.3K
R52 8.2K
R54 1 MEG
R53 5K
C82 0.22 MFD 200V
R55 180
T12
S03 PHONES
C138 .01MFD
R100 5.6K
R101 47 1W
C139 0.02MFD
TS-1
GND
500Ω
32Ω SPEAKER
V17 AUDIO OUTPUT 6AQ5
C127 0.001 MFD
215VDC
RED
WHITE
BLUE
BLACK
L33
C133 0.02 MFD
R98 470K
R99 270 1W
C128 10MFD 50V
SELECTIVITY
C90 4700
C91 0.01 MFD
C92 0.01 MFD
S5C (FRONT)
C110 0.01MFD
R91 47K
C116 15
V15 SSB-CW DET 6BY6
R89 3.3 1W
S4A REAR)
C118 0.02 MFD
R88 47K
C117 330
R86 100K
C119 0.1 MFD 50V
R90 1K
R87, 150K
C131 0.01MFD
T13
CR4
CR5
R106 2K 8W
S4C ON/OFF
F1 2 AMP SLO BLO
PL1
C132 0.01 MFD
6.3VAC
LM1
LM2
LM3
LM4
LM5
R108 33 2W
S5A (FRONT)
R58 1K
RF GAIN
C130 0.22 MFD 200V
R105 10K 2W
R104 330K
C87 4700
C88 0.01 MFD
S5B (FRONT)
C89 0.01 MFD
R59,180
R60,220
R61, 390
FUNCTION



NOTE:

1. UNLESS OTHERWISE SPECIFIED:
   ALL CAPACITORS ARE IN MMFD AND
   ALL RESISTORS ARE IN OHMS, 10%, 1/2 WATT.
2. BANDSWITCH (S1) SHOWN IN 10.4 POSITION. (29.5 TO 30MC)
3. SELECTIVITY SWITCH (S5) SHOWN IN 5KC POSITION.
4. FUNCTION SWITCH (S4) SHOWN IN LOWER SIDEBAND POSITION.
5. AVC-ANL SWITCH (S2) SHOWN IN AVC OFF POSITION.
6. ARE SWITCHES ARE VIEWED FROM FRONT OF SET.
7. VALUES AND TOLERANCES ARE NOMINAL AND VARIATIONS MAY BE FOUND. ANY REPLACEMENT SHOULD CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.
8. ⏚ CHASSIS
9. BAND SELECTOR CONTACTS MARKED * ARE INTERNALLY CONNECTED TO SAME NUMBERED CONTACTS ON OPPOSITE SIDE OF WAFER.

The Hallicrafters SX-115

by Jeff Covelli, WA8SAJ
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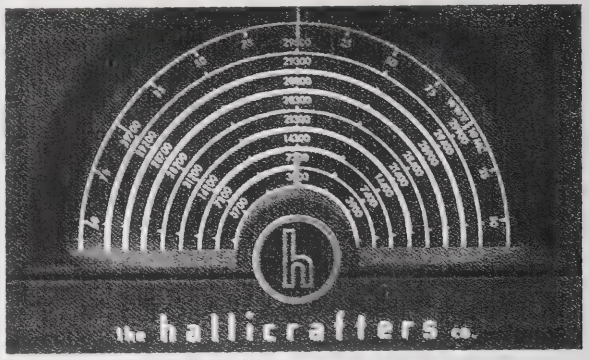
The first time I saw a Hallicrafters SX-115 receiver was when I went into one of the large ham radio stores (Pioneer-Standard) in Cleveland, Ohio as a kid of 12 years old. As I walked through those doors into the ham department, my jaw dropped and I could not believe the sight of all that new Hallicrafters gear being displayed! There it was, on a large desk snuggled alongside a Hallicrafters HT-32B transmitter, HT-33 amplifier, and a T.O. Keyer! Wow, this had to be the deluxe station for all of ham radio. Those half-moon dials were just the things that caught my eye; they looked like real ham gear should look.



Well, as we all know now, the SX-115 was really a very good receiver even by today's standards. A.M. was king and SSB was just starting to roll along about then, and this receiver had the best of both worlds for A.M. and SSB/CW.

Hallicrafters wanted to have a receiver that could compete with a Collins 75A-4, but the SX-115 did not have any mechanical or crystal filters, as did the Collins. The price reflected that difference, about $100 cheaper, which was big money in those days. The name of the game back in 1961 was to have a very heavy receiver so it could be stable; the large tuning mechanism was in vogue, along with big heavy knobs, etc. Well, the SX-115 had an all aluminum chassis that was gold anodized, and this certainly limited the weight to 44 pounds. This was light compared to the SX-101 series at 70 pounds during the same era of time. The front panel was also aluminum, and the knobs were just right for the ham to twiddle, not too large.

The overall look of the receiver is much different from what Hallicrafters had used in the past. It has a square boxy look, with a deep chassis of 16 inches; the width is only 16 inches, and it is 10.5 inches high. This gives you a cozy feeling of having everything right in front of you. The main dial is in a half-moon shape, with calibrations of 25 kHz. A

The elusive Hallicrafter's SX-115 was a high-performance receiver produced from 1961 to 1964 and was intended to compete directly with quality receivers from other manufacturers. While not claiming any all-new design features, Hallicrafters engineers fine-tuned many long standing electrical and mechanical principles and produced an outstanding receiver with performance that stands up to the competition 40 years later.

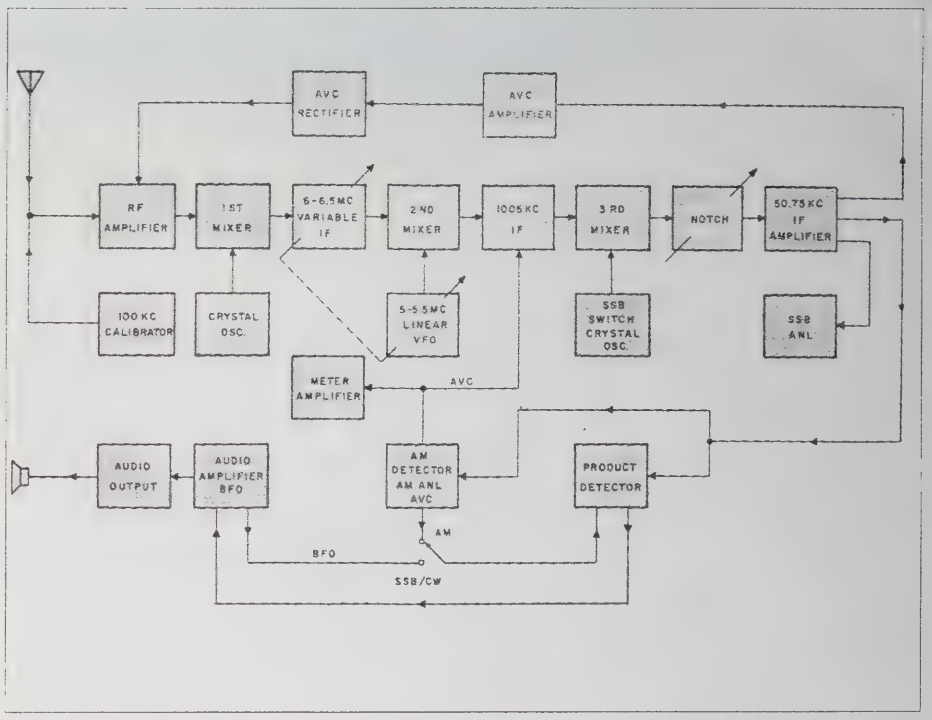
bright red dial pointer moves up and down as the band switch is turned to show what band you're on. There are plenty of #47 lamps that surround the main and sub dials, and at night with the lights turned down, it really looks good. The back of the main and sub dials are jet black, with bright white numbers and lettering which shows up very well at night. The "S" meter is also very good looking, with a black background and white lettering, along with a bright red needle to show signal strength.

The Technical Part

There are a total of 18 tubes and five diodes that make this receiver sing. It is a triple conversion ham-band only receiver, using a variable first I.F. of 6.505 to 6.005 kHz, a second I.F. of 1005 kHz, and finally the famous 50.75 kHz, with switched selectivity.

There is a high order of mechanical and electrical stability. The VFO is stabilized by the use of a large heating resistor under the VFO that stays warm whenever the radio is plugged in. The VFO (5 to 5.5 mHz) is driven by a very smooth, backlash-free split-gear mechanism with a large weighted dial drum, making for velvet smooth tuning. The calibration is better than 1 kHz on the lower sub-dial; it takes one turn of this dial to make a 25 kHz change in frequency, so there is plenty of band-spread.

There are a total of nine band selections; each one is 500 kHz wide. The



The SX-115 block diagram as published in the owner's manual. This figure clearly illustrates the dual-loop AGC systems.

receiver uses crystal-mixed control on all bands for high stability. These bands are WWV on 10 mHz, 80, 40, 20, 15, and four 10-meter sections.

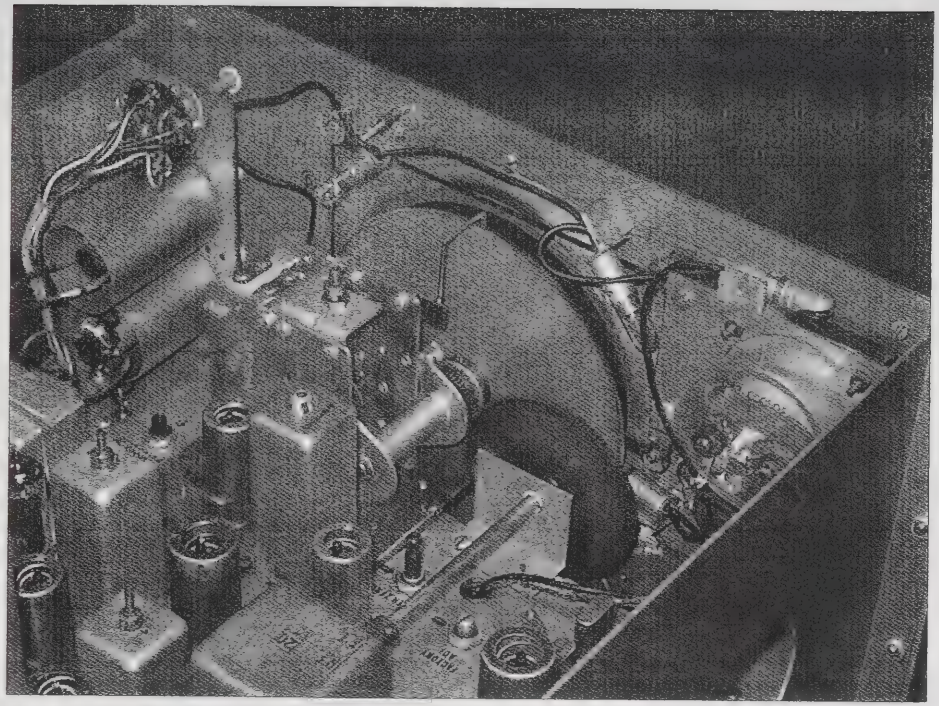
There are separate noise limiters and signal detectors. There is an IF-type noise limiter for SSB/CW and a threshold series-type for AM. Both of the noise limiters are very effective in reducing noise, and it opened my eyes to see how well the SSB noise limiter works. This is not a blanker, but it does suppress the noise enough to enjoy a QSO. A product detector is used for SSB/CW and an envelope detector for AM.

The back panel provides a speaker output of 500 and 3.2 ohms, which is rated at 1.5 watts with 10 % distortion. Also on the back is an eight pin auxiliary socket providing transmit and receive function muting, 50.75 kHz I.F. output for a scope, and a couple of open connections for whatever you might want to do. I have my Digital-Dial on these connections.

Sensitivity is rated at .5 microvolt (uv) for SSB/CW, and 1 uv for AM. The selectivity is variable in five steps providing 0.5, 1, 2, 3, and 5 kHz bandwidths at 6 DB down.

Stability is rated at better than 300 hertz after 15 minutes of warm-up, but my SX-115 drifts about 200 hertz using my digital-dial as a check for drift. The VFO has a differential temperature compensating circuit to accomplish the good stability. I was really surprised to see how stable this receiver really is.

The tube lineup is as follows: 6DC6 RF amplifier, 6BA7 first mixer, 12AT7 crystal oscillator, 6DC6 first IF amp (6 to 6.5mhz), 6BA7 second mixer, 6CB6 VFO (5 to 5.5 mHz), 6DC6 second IF amp (1005khz), 6BA6 third mixer, 12AT7 SSB oscillator, 6DC6 third IF amp (50.75khz), 6BY6 product detector, 6BJ7 AM detec-



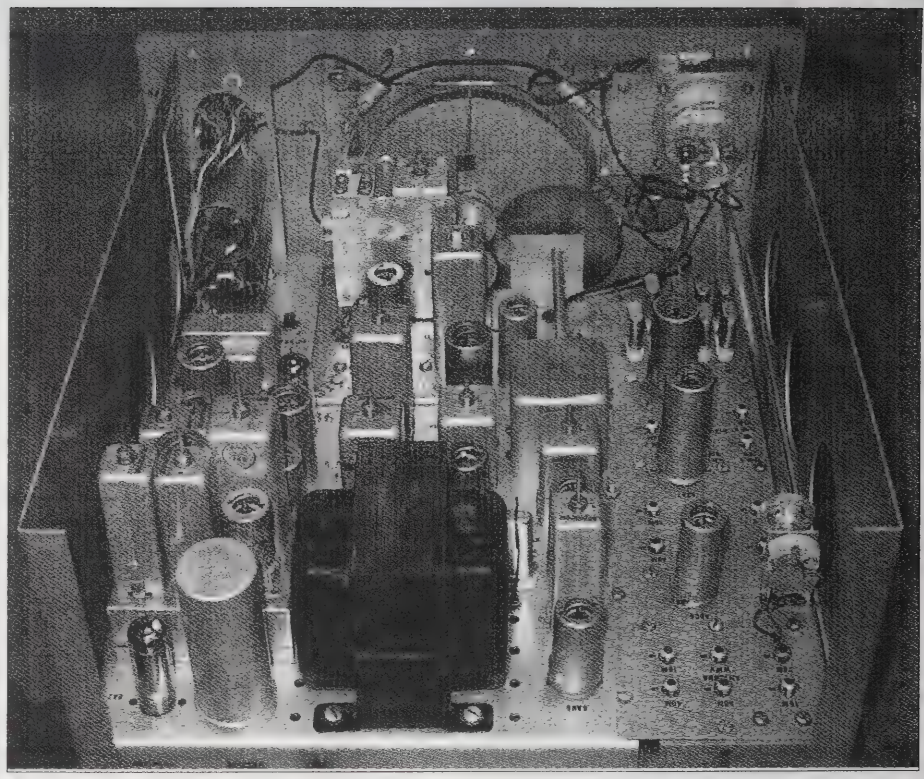
Here's a behind-the-panel view of the VFO assembly. The SX-115 uses a backlash-free mechanism to drive a linear capacity-tuned VFO. The VFO is gang-tuned with the first variable IF transformers to provide a tuneable bandpass response to reject spurious mixer response.

tor, z2nd AGC amplifier and AM noise-limiter, 12AX7 BFO and 1st audio amp, 6AQ5 audio amplifier, 6AU6 100hz calibrator, 6AU6 "S"meter amplifier, 6AU6 1st AGC amplifier, and finally an OA2 voltage regulator.

There is another feature in this receiver that sets it apart from other rigs of the period. The front end has a sharp "band-pass" type of circuit, along with a fine-tuning control. There is a very high-Q "T"-notch circuit in the 50 kHz IF section of the SX-115 that works very well. About 50 db is expected, and it works on both AM and SSB/CW modes.

The 50.75 kHz last IF was very common among the Hallicrafters receivers in the 50's and 60's. It used four high-Q shielded IF cans to avoid any signal transfer by inductive coupling. The selectivity switch changes the "Q" and the coupling of the tuned circuit by selecting various values of capacitance and resistance. Depending on the model of Hallicrafters, some only had a three-position switch versus a five-position switch as on the SX-115. For the most part, this arrangement worked well for Hallicrafters in the years after the SX-115. The SX-117 also used this IF scheme, and it had a three-position selectivity switch until about 1965. I use the 5 khz position most of the time on AM, but even the 3 khz position sounds good for communications quality. On SSB the 2 or 3 kHz is used and it works well, even on the crowded 75 and 40 meter bands.

While I'm on the subject of the 50.75 kHz IF, I'd like to point out that Hallicrafters used the "T-Notch" system in the 50.75 kHz IF on a few of the better receivers. This worked very well in notch-

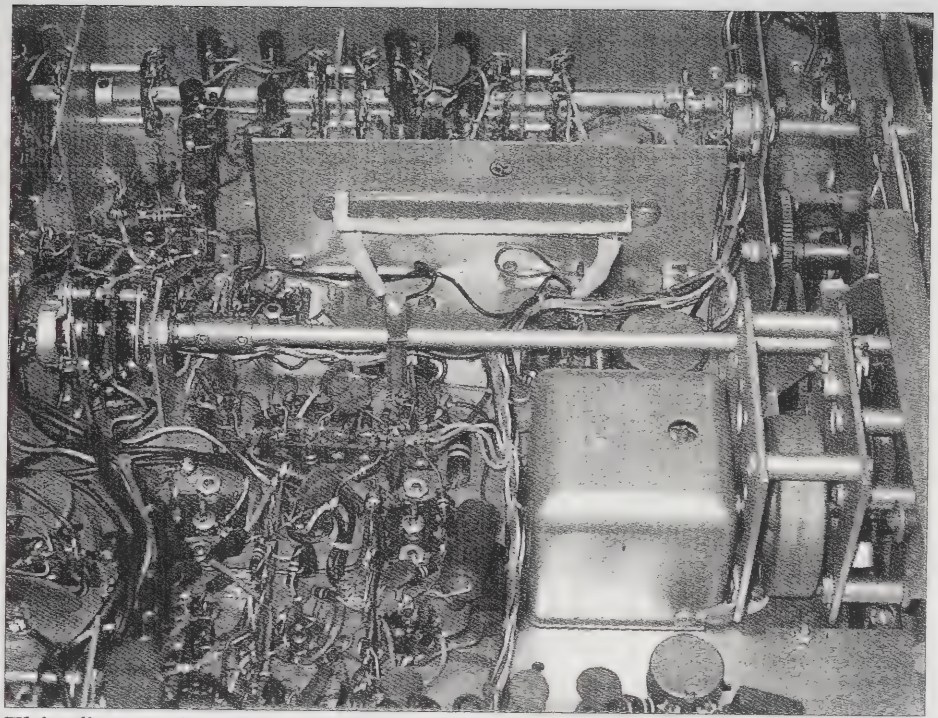


Looking from the rear of the SX-115 chassis shows the 50.75 kc IF transformers mounted on a seperate chassis at the left rear. The first variable IF transformers are just ahead fo the power transformer. The antenna coils are at the right front of the photo, and the 6DC6 RF amplifier is just ahead. This chassis came from the factory gold anodized.

ing out anything within the 50.75 kHz pass-band by a good 50 db! The control is on the front and has calibrations by the IF frequency on the front panel knob.

The beat frequency oscillator (BFO) has a control to set the pass-band of the last 50 kHz IF. This is a nice feature and can be used on both upper and lower sideband. If there is someone close to you, the BFO control works well to eliminate the QRM.

One of the unique features of the SX-115 is that it has a dual amplified automatic gain control (AGC) system, with fast attack and slow release time for smooth sounding recovered audio in all modes. It sounds very good. Most receivers of this time only had a single AGC system. The dual AGC systems work in tandem. The 6AU6 first AGC tube, V-12, comes off of the 6DC6 3rd IF amplifier tube V-11. V-12 amplifies and applies AGC only to the 6DC6 RF amplifier, V-2. This usually will give about 20 DB or so of dynamic range. After that, the second AGC loop takes over, with V-14 (6BJ7) coming off of the detector stage and applying AGC to V-8, the 6DC6 1005 kHz IF amplifier. The 6AU6 S-meter amplifier tube V-13 is also driven from the second AGC loop. By having two AGC circuits, Hallicrafters thought this would give more control over strong signals and it works very well indeed! There



This figure shows the VFO heater, which is a power resistor that is mounted to the large aluminum plate in the top center of the photograph. The metal plate distributes the heat developed in the resistor to the VFO components. At the lower right is the VFO compartment and the large flywheel that is spun by the front panel dial.

is no sign of overload in AM or SSB/CW at all. There is very good control of gain throughout the entire receiver.

Conclusions

After 37 years of being a ham, I finally got the receiver I always wanted after seeing it displayed so well at the ham store. I wore out pages in my Allied, WRL, and Lafayette Catalogs thumbing through them wondering if my paper route money could afford such a deluxe receiver. I can really say this is a very nice receiver, and I have one tied to the Johnson Ranger for AM operation and occasional SSB listening. During my work time at a very large ham store here in Cleveland I never had the chance to see one come in on a trade either, so there must have not been very many of these around. As time went on, I did manage to acquire a National NC-303, and that is a nice receiver. Of course I sold it as a kid. Hope to work some of you folks down the page OM, with my SX-115.

ER

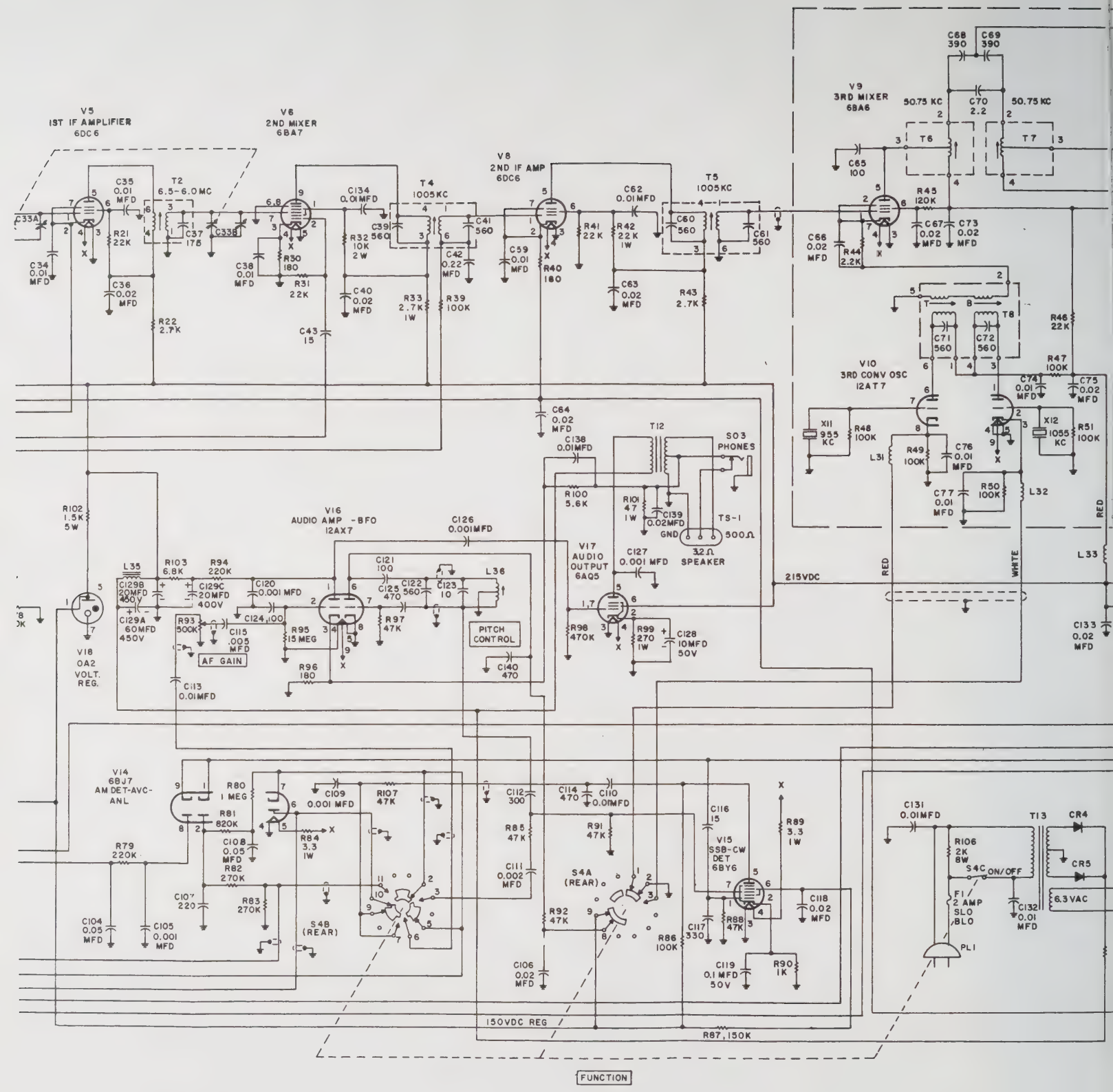
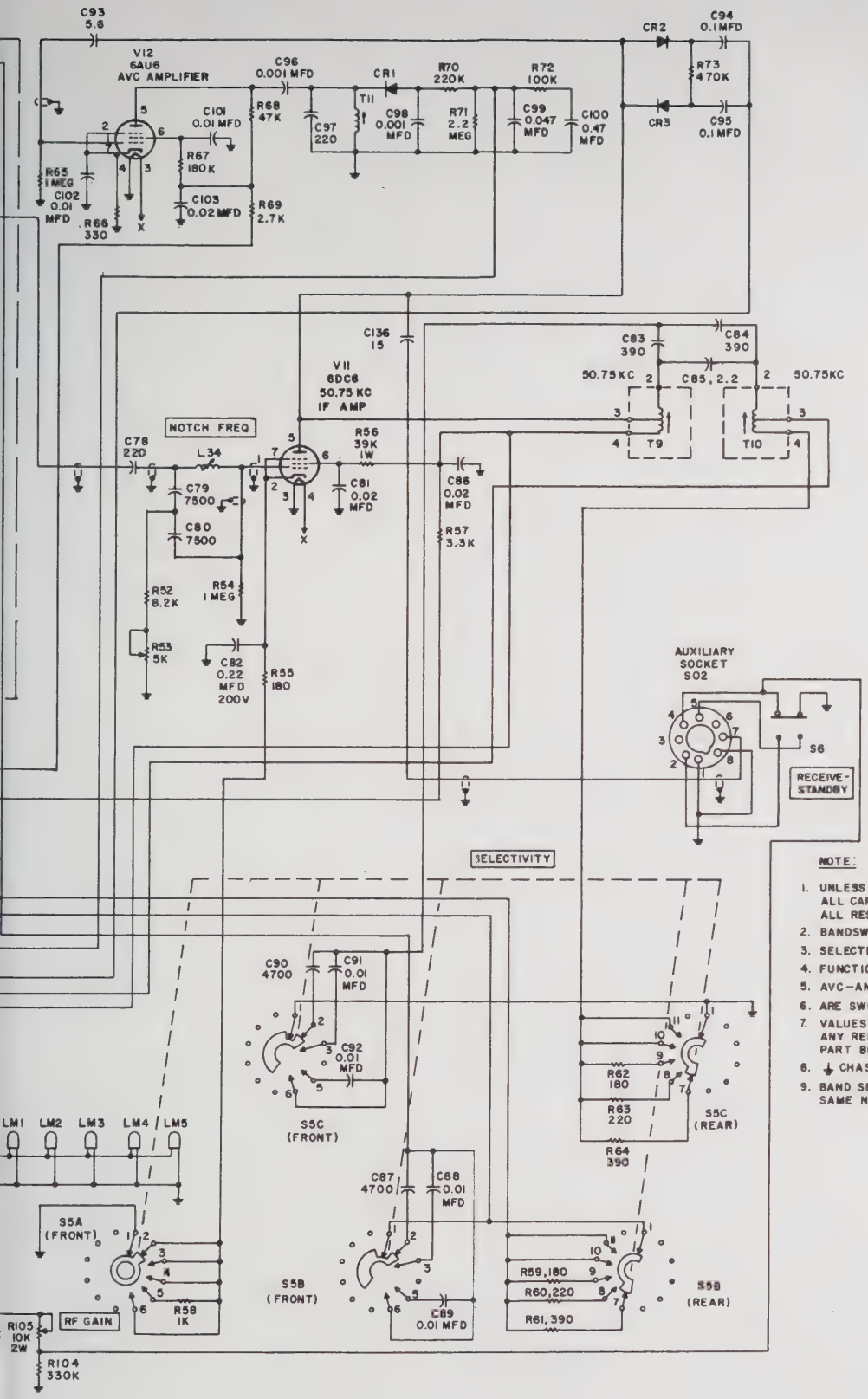


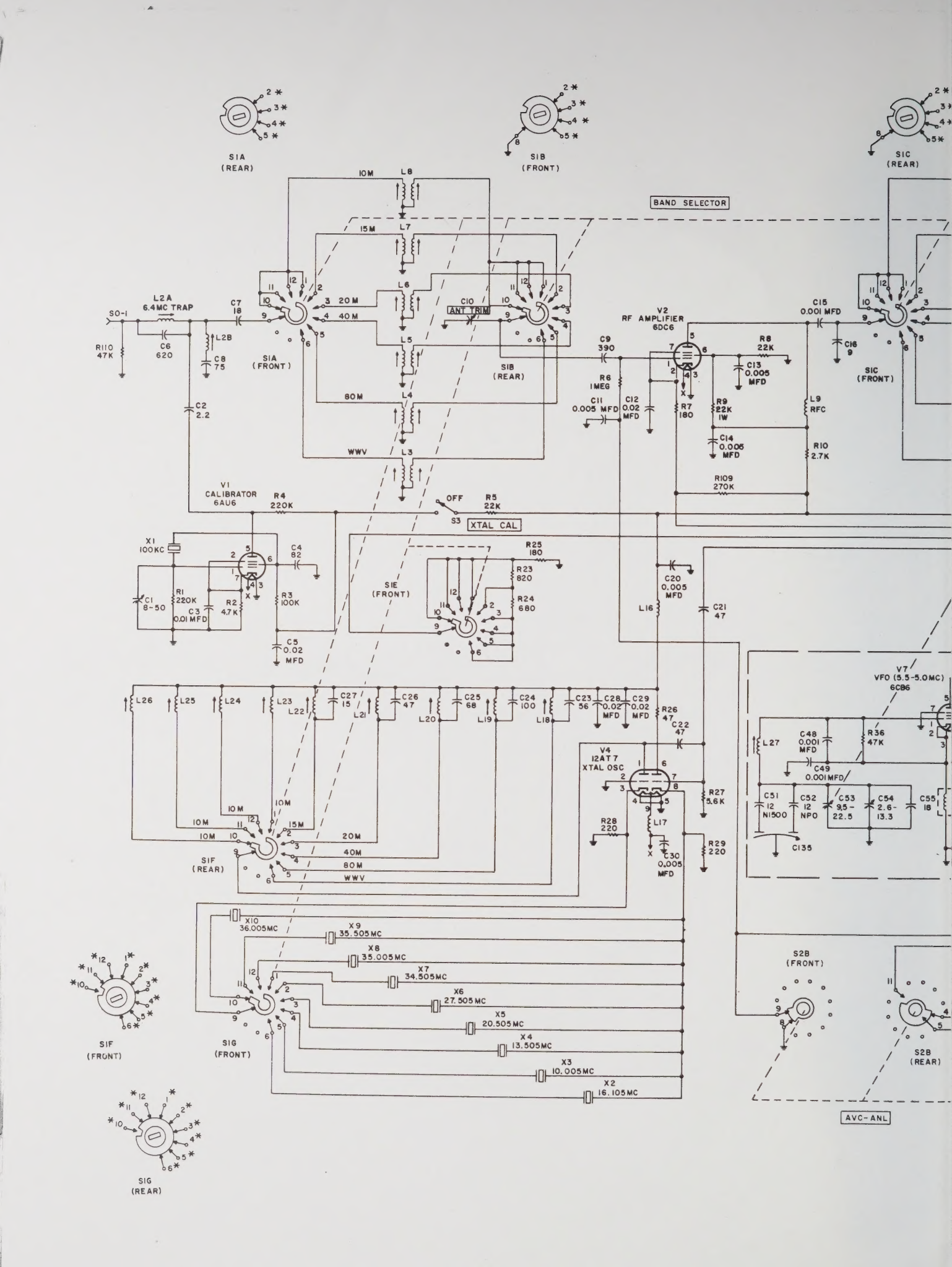
Figure 17. Schematic Diagram of the Receiver.



NOTE:

1. UNLESS OTHERWISE SPECIFIED:
   ALL CAPACITORS ARE IN MMFD AND
   ALL RESISTORS ARE IN OHMS, 10%, 1/2 WATT
2. BANDSWITCH (S1) SHOWN IN 10.4 POSITION. (29.5 TO 30MC)
3. SELECTIVITY SWITCH (S5) SHOWN IN 5KC POSITION.
4. FUNCTION SWITCH (S4) SHOWN IN LOWER SIDEBAND POSITION.
5. AVC–ANL SWITCH (S2) SHOWN IN AVC OFF POSITION.
6. ARE SWITCHES ARE VIEWED FROM FRONT OF SET.
7. VALUES AND TOLERANCES ARE NOMINAL AND VARIATIONS MAY BE FOUND. ANY REPLACEMENT SHOULD CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.
8. ⏚ CHASSIS
9. BAND SELECTOR CONTACTS MARKED * ARE INTERNALLY CONNECTED TO SAME NUMBERED CONTACTS ON OPPOSITE SIDE OF WAFER.

089-002327


S1A (REAR)
S1B (FRONT)
S1C (REAR)
BAND SELECTOR
10M L8
15M L7
L6
20M
40M
L5
80M L4
WWV L3
L2A 6.4MC TRAP
L2B
S0-1
R110 47K
C6 620
C7 18
C8 75
C2 2.2
S1A (FRONT)
S1B (REAR)
C10 ANT TRIM
V2 RF AMPLIFIER 6DC6
C9 390
R6 1MEG
C11 0.005 MFD
C12 0.02 MFD
R7 180
R8 22K
C13 0.005 MFD
R9 22K 1W
C14 0.005 MFD
C15 0.001 MFD
C16 9
L9 RFC
R10 2.7K
R109 270K
S1C (FRONT)
V1 CALIBRATOR 6AU6
R4 220K
OFF
S3
R5 22K
XTAL CAL
X1 100KC
C1 8-50
R1 220K
C3 0.01 MFD
R2 4.7K
R3 100K
C4 82
C5 0.02 MFD
S1E (FRONT)
R25 180
R23 820
R24 680
C20 0.005 MFD
L16
C21 47
L26 L25 L24 L23 L22 L21 L20 L19 L18
C27 15
C26 47
C25 68
C24 100
C23 56
C28 0.02 MFD
C29 0.02 MFD
R26 47
C22 47
V4 12AT7 XTAL OSC
R27 5.6K
R28 220
L17
C30 0.005 MFD
R29 220
S1F (REAR)
V7 VFO (5.5-5.0MC) 6CB6
L27
C48 0.001 MFD
C49 0.001MFD
R36 47K
C51 12 N1500
C52 12 NPO
C53 9.5-22.5
C54 2.6-13.3
C55 18
C135
X10 36.005MC
X9 35.505MC
X8 35.005MC
X7 34.505MC
X6 27.505MC
X5 20.505MC
X4 13.505MC
X3 10.005MC
X2 16.105MC
S2B (FRONT)
S2B (REAR)
S1F (FRONT)
S1G (FRONT)
S1G (REAR)
AVC-ANL

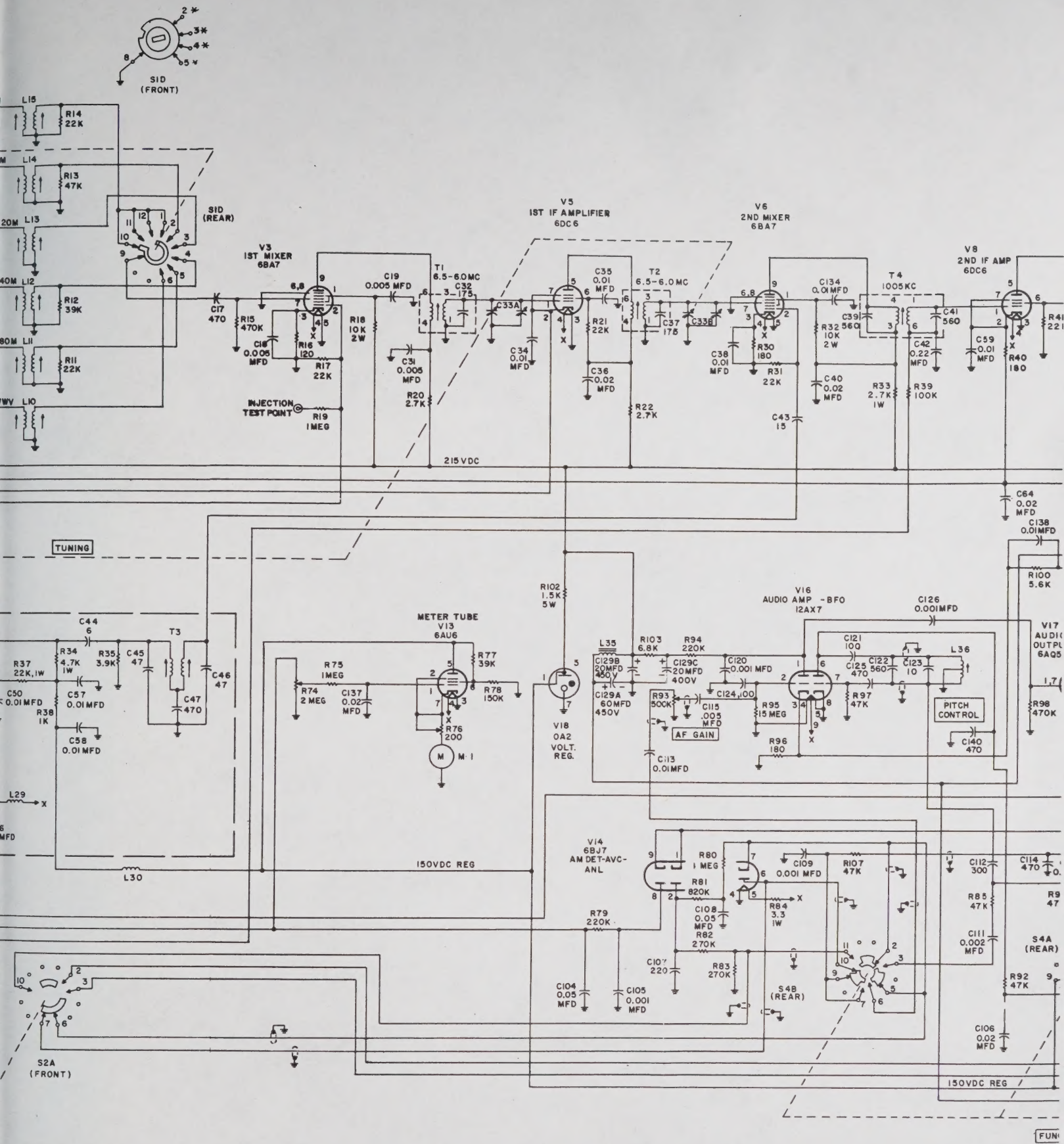


Figure 17. Schematic Diagram of the Receiver.